PRIZE ESSAY,

[illegible]

Illustrations of Disease

WITH THE MICROSCOPE.

CLINICAL INVESTIGATIONS,

[illegible]

A CONTRIBUTION INTENDED TO DISCLOSE THE MINUTE HISTORY OF THE DISEASES PREVAILING IN THIS LATITUDE, AND TO ASSIST FUTURE STUDENTS.

[illegible]

BY FRANCIS PEYRE PORCHER, M. D.

[illegible]

PART FIRST.

WITH ONE HUNDRED AND TEN ILLUSTRATIONS ON WOOD.

"NATURA MAXIME MIRANDA IN MINIMIS."—*Linnæus*.

[illegible]

CHARLESTON, S. C., C. S. A.

PUBLISHED BY THE SOUTH CAROLINA MEDICAL ASSOCIATION.

EVANS & COGSWELL, PRINTERS.

1861.

PRIZE ESSAY,

(To which the First Prize of One Hundred Dollars, offered by the South Carolina Medical Association, was awarded February, 1860.)

Illustrations of Disease with the Microscope.

CLINICAL INVESTIGATIONS,

AIDED BY THE MICROSCOPE, AND BY CHEMICAL REAGENTS: WITH MICROSCOPICAL OBSERVATIONS OF PATHOLOGICAL SPECIMENS, MEDICAL AND SURGICAL, OBTAINED IN CHARLESTON, S. C.

A CONTRIBUTION

INTENDED TO DISCLOSE THE MINUTE HISTORY OF THE DISEASES PREVAILING IN THIS LATITUDE, AND TO ASSIST THE STUDENT IN

With upwards of Five Hundred Original Drawings from Nature,

MADE AT THE TIME OF THE OBSERVATIONS,

BY FRANCIS PEYRE PORCHER, M. D.

LECTURER ON MATERIA MEDICA AND THERAPEUTICS.

PART FIRST.

WITH ONE HUNDRED AND TEN ILLUSTRATIONS ON WOOD.

"Natura maxime miranda in minimis."—L[illegible].

"Where there is an obscurity too deep for our reason to [illegible]"
Sir Thomas Browne's "Relig. Med[illegible]"

CHARLESTON, S. C., U. S. A.
PUBLISHED BY THE SOUTH CAROLINA MEDICAL ASSOCIATION
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1861.

PREFATORY.

THE microscope used was made by Nachet, in P[illegible] —a fourth of an inch object glass being gener[illegible]ploy The wood engraving was undertaken by Mr. I[illegible] Jerrold, of London, England. He did not com[plete] contract entered into with him, and much the larger por[tion] of the Essay was sent on to New York to have the wood cuts finished, which it has been found impossible to have returned during our present difficulties. Hence the great delay in the appearance of the Essay has been entirely beyond my control, or that of the Committee on Publication. I little thought that I should have this part of the work to do; but, seeing no alternative in the present condition of affairs, and having procured the proper instruments, I undertook to complete the cutting of a very large number of the blocks—seventy of the one hundred and ten blocks, illustrating Part 1st, having been left in an imperfect state by Mr. Jerrold. This proved a very exacting task, and occupied leisure moments during several months, though the transfer of the drawings upon the wood, and much of the more difficult portions of the work, had been completed by the artist.

Part 1st, now issued, is scarcely one-third of the entire paper, it will be remembered, and it only embraces the introductory portion, and one section containing the "Appearances observed in Yellow Fever." The original draw-

ings of this having also been the first executed, are necessarily much more roughly done than those attempted when more experience was had. I regret that the illustrations of Intermittent and Remittent Fevers could not also have been included in the present issue. Several pages have been added to the Introductory Essay, since it passed through the hands of the Committee. It may not be amiss to state here that one or two of the smaller figures, among the few entirely executed by myself, were done upon blocks prepared from our common swamp Dogwood (*Cornus Florida*); and engravers in this city have also, upon my recommendation, used it with satisfactory results. I found both the Persimmon and the Holly too soft for the purpose.

I take occasion to suggest to engravers on wood, though never having tried it, the Service Tree—*Amelanchier canadensis, L. Aronia botryapium, Ell. Sk.*—growing in South Carolina, as, probably, only inferior to the Boxwood. The sum expended at the North for wood sufficient for Part 1st of this Essay, has already amounted to no inconsiderable amount—which item, only, of the expense of publication was defrayed by myself.

The subject, in the present aspect of our country, is an important one.

I have to thank the Committee on Publication for the evidences they manifested of the most liberal spirit as regards the expenditure necessary to a publication of this kind, and again express my regret that the entire work; with all the drawings, cannot be examined at one view, as originally contemplated by the writer, in order that more comprehensive and, consequently, more satisfactory comparisons might be presented. The Introductory Essay, however, is based upon a review of the whole paper.

Charleston, September 15*th*, 1861.

INTRODUCTORY ESSAY.

I would deem it necessary to offer an apology for the presentation of this paper, had it been prepared in a few months; but, as it contains the results of three years of almost daily labor (from June, 1856, to September, 1859), with every sense of its imperfection, I consider such apology less necessary. It is submitted, therefore, with the hope that, by means of it, not only will increased light be thrown upon some of the diseases met with in our midst, their symptoms and phenomena; but, also, that, by aid of the drawings, future investigators will be enabled more readily to avoid those difficulties which beset the author in this—a pioneer enterprise in this State and city. For, when I began, I could obtain scarcely any assistance, so far as one entire department of research was concerned. In Histology, embracing the minute anatomy of tumors, cancerous growths, the structure of vegetable cells, etc., I had enjoyed the benefit of several months daily instruction from M. C. Robin, in Paris, 1853–4; but, in the difficult, if not obscure, study of Renal Pathology and Crystallography, I was compelled to trust to my own efforts, aided only by the Atlas of Plates attached to M. M. Robin and Verdeil's "*Traité de Chimie Anatomique et Physiologique*," the works of Golding, Bird, Prout, Bowman, Beale, Thudichum, Hassall, and others. These, however, were only resorted to to assist in the identification of objects under inspection. The matter presented is original, and obtained by personal observation.

This material, to be profitable, must necessarily be large

in bulk, because only from an extended series of minutely recorded observations can those comparatively few constant characters be eliminated which are peculiar to, and possibly diagnostic of, certain diseases. Only by *accumulating* the observations, noting even the most *apparently* trivial and unimportant phenomenon, if its abundance was sufficient to render it characteristic, could I hope to ascertain what belonged to the disease by its very nature, and to distinguish this from what was variable or only accidental. Besides, even negative observations possess a positive value, inasmuch as they tend to set at rest, as I hope the results will prove, litigious questions touching the presence or absence of certain principles supposed to exist.

Speaking generally, I am indebted to the advantages of a residence in, and the accidencies of, a large city, and to certain hospital facilities, for the ability to make these imperfect researches—having been for several years Physician to the Marine Hospital, in Charleston; also, to the kind co-operation of a number of my professional brethren, both here and in the surrounding districts, who sent me numerous specimens for examination. Among these, I should especially mention the late Dr. P. C. Gaillard, and the medical gentlemen, house physicians of the Roper Hospital: Drs. Trescott and Seabrook, Parker and De Saussure, Jr.; Dr. Cain, formerly Physician to the Marine Hospital; Drs. Dickson, P. Porcher, De Saussure, Happoldt, Chisolm, Raoul, Bruns, Westcoat, Huger, Fitch, Snowden, Pettigrew, F. Geddings, as well as several residing out of the city.

The *specimens* of diseased action examined and re-examined are quite numerous. The cases investigated are classified, and number 300(?)

They embrace: Yellow Fever; Remittent, Intermittent, and Continued Fevers; Black Vomit of Yellow Fever and, for *comparison*, Black Vomit of Bilious Fever, of Cancer of the Stomach, of Enteritis and ordinary Vomit; Nervous and Hysterical Disorders; Dyspepsia and Indigestion; Jaundice; Dropsy; Pneumonia; Rheumatism; Scarlet Fever,

Albuminuria, Chylous Urine; Scrofula, Osseous
tions, Syphilis; Catarrh and Inflammation of U.
Bladder; Renal Excretion of healthy individual a
parison; Fluids obtained by Trocar, Fluid from Ven
of the Brain; Blood Pus, Mucus, Bile; Tumors; Cholelith-,
Concretions; Secretions and Excretions of various kinds,
healthy and morbid.

I have not included in this collection the complete account of histological and vegetable specimens in my possession, examined whilst in Paris.

The Statistical Tables appended are the product of much labor, and they serve to represent at a glance, numerically, the characteristic features of certain diseases, or classes of allied diseases. They required for their preparation, first the classification, and next the examination, of the entire paper.

Amid the conflicting duties of daily practice, lectures, and other demands upon my attention, I could not hope to give that scientific completeness desirable, to every detail of procedure, so far as *chemical* appliances are concerned. If this had been essential, then nothing could have been done by me. It pretends to be only numerous observations of facts, and searchings, whether successful or unsuccessful, after characteristic features of disease, however roughly made or crudely put together. But, in the representation of objects observed by the microscope, I have endeavored to be accurate.

For example: Any one at all familiar with the subject, recognizes a typical crystal of the ammoniaco-magnes. phosphates, of uric acid, of oxalate of lime, or a blood corpuscle, etc., with different degrees of ease. It was not necessary, therefore, to represent these elaborately in every instance. The fact of their presence stated, and a few accurately drawn, suffice for all purposes. Accurate measurements are not essential to a large proportion of these. The word of the observer must be taken when names are assigned—for he has a guarantee in his daily observation of numerous objects, his opportunities for instruction, etc.

But the drawings, though executed with the pen for the most part, will remain for any persons coming after to identify, interpret, or comment upon as they please. Their value consists in this—that, after much trouble in securing them, they were executed from an inspection of morbid specimens that *existed* of many diseases observed repeatedly. In the preparation of the wood cuts, I have caused to be retained almost every object originally represented from an inspection of the field of the microscope, because they serve to show the predominance of certain substances, and some, though apparently valueless, may one day be recognized as peculiar or important. Dr. Lionel Beale says, on this subject, in his work, the "Microscope in Medicine":

"It may almost be said that all progress in our knowledge of minute structure, both in healthy and diseased tissues, depends upon the drawings which are made. It is almost hopeless for an observer to attempt to describe what he sees in words, and such descriptions, however careful they may be, cannot possibly be compared with those of others. On the other hand, a truthful drawing of what a man has seen lately, may be compared with others which may be made a hundred years hence, although the means of observation will be far more perfect than they are at present. Much will be learned by such comparisons. I am sure that an honest enquirer cannot be of greater use, in his time, than by making good drawings of what he has seen; they will be of far greater help to our successors than any amount of description we can write for them, and we may feel sure they will look at our drawings if they are honest copies of nature, while we all know that, comparatively, very little of what we write will be read, when the whole aspect of this department of science shall be changed. * * * A good knowledge of drawing, of the stethoscope, of the opthalmoscope, and, indeed, of any other investigation accessory to medical research, requires far more devotion than is implied in the mere sacrifice of the money which is necessary for the purchase of books and instruments. So it is

with the microscope; and he who has the largest means at his disposal for obtaining the most costly instrument made, and all the books published on the subject, with the advantage of the best tuition, is hardly so likely to become a useful, earnest laborer in this field of enquiry as the student who spends his five pounds in a simple instrument, without any unnecessary luxurious arrangements, with a conviction that the study is real and worthy of attention, and with a determination to set to work honestly and zealously, with the hope of being one day able to add his work to that of men who worked before him, whose lives and labors he respects and honors. Every observation should be carefully recorded in a note book, at the time it is made, and drawings made if necessary."

The applications of chemical tests, the counterproof by reagents, and the search in almost every case for several important elements, including: albumen, bile, purpurine, sugar, nitrate of urea, iodine, etc., etc., are numerous, and they must possess their own special significance. Besides, the collection will, probably, for some time remain unique, as, perhaps, few will possess the inclination to continue, for a length of time, investigations often so difficult, disagreeable, and exacting. Any subsequent investigations of like character, whether by myself or others, may be inserted at any time; and it is desirable that they should be extended, that the results, when tabulated anew, may be made more striking and conclusive.

After most of the material had been already collected, it has required four months of almost uninterrupted labor simply to prepare it for presentation; indeed, the entire period contemplated by the Association as sufficient for a contribution worthy their attention, was thus consumed.* The figures take up a great deal of space, and this, with

* As much delay was caused, subsequently, during the execution of the wood cuts, I have continued to make additions to the paper up to September, 1861, when it was put into the hands of the printer.

the unoccupied portion of many pages, contributes to swell the bulk, and make the length of the paper more apparent than real.

Every tyro now knows that even the slightest muscular contraction gives rise to a corresponding molecular change, accompanied by *waste*, however inappreciable. It was an important step made in organic chemistry applied to physiology, to the fundamental thought of which the Italian, Bufalini,* was conducted as far back as 1819. Matteucci, Liebig, Draper and others, only more fully developed that thought. So that a *sensation*, we may say, even leads to fatigue, and is more closely related to a special chemical phenomenon than to mere mechanical motion. It is as if there was a *respiration* going on even in the muscles. Whilst we remember this, and, therefore, admit that matters exuded, secretions and excretions (to confine myself to these alone, for the moment), infinitely *vary* in certain diseases, and even, perhaps, at certain stages of each disease; yet, it is not less true that there *are*, also, broad distinctions or characteristics, founded upon the nature of the excreta, which belong to each disease almost exclusively. It is not pretended that the principles or elements giving rise to these distinctions are never found elsewhere; but that they are never so marked either by their frequency or amount. These visible characteristics, when once established by aid of the microscope or by chemical reagents, as distinguishing, by their unusual presence, certain diseases or classes of disease, necessarily throw some light upon their nature and the rationale of their phenomena, and even give indications for their prevention and cure. For, knowing, if not the *materies morbi*, at least, some of the *results* of dis-

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† *Fond. di Patolog. Analit. di Bufalini*, 2. Also a translation by the writer from the *Gazetta Medica Italiana Toscana*, published among the *Abstracts* in Charleston Medical Journal, Vol. XIII.

eased action, as shown in the excreta, we are surely in a better position to attempt their removal or prevention. For we must assume that the matters eliminated—products of exudation and earthy or animalized deposits—bear a certain relation to diseased organs as well as to the essence of diseases themselves. I will now endeavor to substantiate what I have just said by the acknowledged admissions of some of the highest authorities in the profession, with respect to certain affections which I will select, before proceeding to state what additional conclusions I have arrived at as the result of my own observations.

It will not be denied that Rheumatism and Gout are generally *characterized* by what may be called the acid diathesis, viz: the prevalence of *excess* of acidity in the system at large, and by the presence of lactic and uric acids in the discharges from the kidneys, and even in the blood; the tophi and chalky exudations of one of these being, for the most part, composed of urate of soda and also of uric acid. See contributions of Todd, Johnson, Garrod, Gairdner, Adams, Headland, Richardson, and others. These are broad and well-marked distinctive features of these two obscurely-related affections—however they may be accompanied or not by other peculiarities—as the individuals suffering from them have been subjected to varying external or internal conditions. These affections become daily less obscure as our acquaintance with the peculiarities referred to as distinguishing them is improved. The general plan of treatment, also, by alkalies and renal depurants acting on the blood, or even applied locally to the relief of inflamed joints, is to remove these special *materies morbi*—occasional failures in this attempt in no way modifying the argument. The same is true of Scarlet Fever, and the special liability to *albuminuria* and anasarca, with uric acid in the renal discharge, accompanying or following its attack, and entirely irrespective of any views we may entertain regarding the complemental action of the skin and kidney, in a disease where true inflammation of the capillaries of the surface is so marked. Can there be

any doubt that congestion of the kidney, with *albuminuria*, are almost characteristic of this affection? And, from a consideration of this latter phenomenon, when we have once established it, we argue back to the pathology of the kidney, and thence to that of the blood and skin, just as we may legitimately reason concerning the nature of a disease and special condition of a diseased organ, from the uniformity of the action of certain agents in modifying them—which is only realizing the truth of the Hippocratic maxim: "*Naturam morborum curationes ostendunt.*" So, also, Brights' Disease, with characteristic tubular casts and albumen escaping in excess! had the original observations of the latter in the urine by F. Simon, of Berlin, nothing to do with the establishment of the co-existence of desquamative nephritis? Even the subdivision of the latter into three varieties has been the result of researches, by aid of the microscope, for the most part externally to the kidney itself; and investigations respecting the structure of the Malpighian tufts, and their physiological functions, only tended to corroborate the views with regard to the pathology of the disease, previously deduced from the escape of the several *varieties* of tubular casts. Are not careful study of these *products* of *diseased action* (if not of the disease itself) now assisting us to *distinguish* between the albuminuria of the *Morbus Brightii*, and that occurring in women *encientes?* and may they not throw some light upon the eclampsia to which the latter are especially liable?

Uræmic poisoning of the blood and brain, is a reality acknowledged by the most competent authorities. How could any one suspect the *cause* of this variety of coma, unless from the absence of urea in the renal excretion being proven, or that some obvious congestion of the kidney gave rise to a suspicion of its retention in the system? However, uræmic intoxication is a *characteristic* result of congestion of the kidney, of the excessive production of urea during the metamorphosis of the tissues in the waste and repair of the system, particularly during morbid states of the blood, or other arrest of the normal escape of this

principle. Hæmaturia and Dysuria, with the escape of *blood* as a *characteristic*, is a form of disease common among natives of the Isle of Bourbon, and the detection of this feature serves to *mark* the disease, whatever other symptoms may accompany it; and this is just as philosophical as that the more obvious presence of *blood* in the fecal discharges should lead us to assign a certain character and name to the affection of the intestinal canal (Dysentery), the existence of which it very rationally leads us to suspect. It is only that many reasons exist to prevent as careful and frequent a study of this excretion—though M. Marcet has not shrank from this, also, and many physicians *do* find it to their advantage to inspect sometimes the intestinal and other discharges.

To proceed: The *prominent* fact about Jaundice, is the saturation of the system by *bile*, with the usual phenomena obviously consequent thereto. The most prominent feature in *osteomalacia*, is the enormous proportion of phosphate of lime present; and the comparatively recent discovery of the constant presence of chloride of sodium in the secretions from the kidney in certain diseases and its absence in that of others, is a sufficiently striking illustration. Nervous disorders, and those slowly wasting away the powers of the system, are for the most part characterized by great discharge of the *phosphates* and *urates* of *soda* and *ammonia*, and sometimes by *phosphate* and *oxlate* of *lime*. So, Intermittent, Remittent and Yellow Fevers, as well as other diseases not yet studied with a view to testing these questions, may be and, in my opinion, *are* found to differ in the greater or less amount in which certain principles are excreted from, or retained in, the system. By the more accurate determination of this difference, and by tracing these principles up to their source, we may also one day hope to separate more clearly still, the diseases in which they are respectively found to predominate.

But, setting aside all this, of the existence and reality of many of these great distinguishing features or characteristics referred to above there is hardly a dispute.

Now, to establish the presence or absence of these, and to add to their number if possible, is only one of the very objects of these researches. Indeed, the great body of the material contributed by writers on Renal Pathology, and where the microscope and chemistry are employed, is of this character, and their labor must be judged of finally by its *fruits*. In such laborious, ofttimes disagreeable processes, much may be found to be useless, and will be discarded accordingly; but the workers will be rewarded, in my humble opinion, if they shall succeed in establishing as much more as has been already confessedly done since the time of Prout. The truth is, he is blind who does not perceive that the humoral pathology is being revived under happier auspices, and that *animal chemistry* is being rapidly brought to the assistance of researches in anatomy, physiology and practical medicine, including therapeutics.

Let us next enquire if researches such as these under consideration have not an important bearing upon *diseases* with which they are not often associated by the profession generally. The relative heat and combustion noticed in the bodies of those sick with *fever* (however primarily *dependent* upon the altered state of the nervous media and the capillary system caused by the action of malarial, animal or blood poisons, or even by atmospheric and electrical vicissitudes), occasions the burning out of the nitrogenized protein compounds and hydrocarbons: as seen by the abundance of what I may call their *effete representatives* in the intestinal and renal excretions. These are the phosphates, urates, uric acid, etc. Or if, from impaired integrity of structures, or from morbid congestions, the combustion had not been complete, some of the original protein compounds, viz: albumen, fibrine and animal matter accumulate in too great quantities, or are *not* rendered effete—not burned out—they pass out and are recognized in the renal excretion in morbid excess, unchanged or only partially changed. We are thereby led to suspect the existence of such over-production, or of such obstacles. It will be re-

membered that in health the protein compounds, fat, starch, sugar, etc., are always used or destroyed, and never excreted as such. However, the consideration of all these facts goes to make up, in the opinion of the writer, an important portion of our most plausible theories and speculations at the present day concerning fevers, and very justly. For by them we are often enabled to remount to the most recondite principles or elements involved in the causation and progress of fever, as well as of inflammation generally. The fact of their presence established also reflects light upon the functions and operations of the capillary tubes, their dilatation or contraction, as well as of the most important of the glands and other emunctories of the body, so constantly implicated as well in fevers as in other diseases. The truth is, hardly a problem can be constructed concerning the causation and nature of fevers as well as other diseases, without these products of microscopical and chemical research entering as important elements.

An appreciation of the precise condition of the cutaneous, renal and intestinal *excretions* must, therefore, be important; and the consideration of what may be called their *morphology*, a term I am not conscious of ever having seen applied in this way before, though seemingly forced upon me by the progress of modern Physiology and Pathology, is especially important. For it involves a knowledge of *all* the changes occurring to them previously to their expulsion; and hence includes the history of the formation, growth, maturation and decay of many of the most essential elemental substances engaged in the nutrition of the human body. We should observe that all these are especially implicated during diseased states. For, if we admit that final destruction, more or less complete (that is, so far as its nutritive powers are concerned), is consequent upon the complete assimilation and use of *food* introduced into the system, out of which food protein compounds are first supplied, together with the blood corpuscles conveying nutritive materials for the tissues, preparatory to their downward retrograde course when they assume the condition and form of

excretions, it must, of necessity ensue: that the relative absence of normal destruction, or the presence of abnormal substances exhibited in the excreta (the renal, for example) must be significant of morbid congestions, lesions, impaired functions, nervous injury, etc., which *disturbed* the normal metamorphoses. This is demonstrable from what has been said above, as well as from a quotation I will make directly from M. E. Robin. But first, to include all the data, as there was only one other possible condition not stated, I add: That when, from gastric or intestinal inflammation, cancer of the stomach, nervous atony or impaired nervous energy, causing or caused by blood poisoning (*fever*, in other words), there can be absolutely no assimilation or absorption of food supplied from without; the excreta must, under these circumstances, represent substances destroyed, which have been robbed from the body itself, viz: carbonaceous matters, hydrocarbons and carbohydrates—the derivatives of the protein compounds stored away in the shape of fat; and in this way we readily account for the simple fact of wasting and emaciation occurring under such circumstances.

M. Edward Robin, in a paper read before the Academy of Medicine of Paris, and republished in the London Lancet, makes the following remarks in reference to the behavior of one of the most important of the substances referred to above:

"In the normal state the albumen is burned in the blood, and the nitrogenized residue of this combustion, viz., urea and uric acid, is eliminated by the urine. M. Robin thinks that if, during a sufficiently long time, the albumen underwent in the circulation a much smaller amount of combustion than is habitually the case, it might pass unaltered in the urine, instead of being thrown off in the form of urea and uric acid;" and he cites, adds the Lancet, several examples of disease where the arrest of combustion exists and albumen makes its appearance, as in croup, capillary Bronchitis with dyspnœa; Phthisis complicated with Pneumonia and marked with difficult breathing; in gestation

when sufficiently advanced to occasion an habitual congestion of the kidney owing to an impeded abdominal circulation: in such states of the system "in which a very incomplete respiration causes a marked diminution of combustion." It is also albuminous in cyanosis, in idiopathic or traumatic lesions of the nervous centres, in diabetes, a "disease where very often a lesion of the nervous centre seems to be the origo mali, and where the great amount of sugar in the blood seems to be an obstacle to the combustion of the albumen." As a general rule, he adds, the urine of the common mammalia and of birds contain no albumen. Reptiles, on the other hand, remarkable for the low temperature of their animal heat, yield urine in which albumen is always to be found.

"When the activity of the combustion which takes place in the blood is too feeble to burn the whole of the albumen, which in the normal state should be consumed in a given time, the general vitality is diminished, and thus more or less albumen is allowed to pass unaltered into the urine, viz: just so much organic matter as escaped the transformation into urea or uric acid. The proportion of urea contained in albuminous urine should, therefore, be smaller than it is found in normal urine, and such is found to be the case in the following diseases, the only ones according to the author, in which experiments have been made, viz: Pulmonary Phthisis, diseases of the cerebro-spinal axis, extensive and acute Bronchitis, with intense dyspnœa and Bright's Disease."

We will see farther on what bearing some of my own conclusions, deduced from the statistical tables presented, have upon these remarks just quoted.

To show that the particular variety or kind of nutrition, or its arrest as by congestions, fevers, or other diseased states, *has* a marked influence upon the excreta, we can also appeal to comparative Physiology: In herbivorous animals (as rabbits), whose urine is normally clouded, troubled, *alkaline*, and charged with the carbonates, whilst it is poor in phosphates and urea, *abstinence* causes it to be

rich in phosphates and urea, rendering it clear and *acid* as in the carnivora. This is because the phenomena of nutrition must then be accomplished at the expense of the azotised principles of the blood. Analogous differences have been observed between birds of rapid flight and serpents or other hybernating animals which consume the dépot of food stored in their own bodies.

And, even with respect to the special mode of action of certain medicinal agents, without citing numerous examples at his disposal to show that such examinations are not futile, the writer will allude to one substance, concerning which he published his views some time since, and which were based upon researches of this character. They tended to prove that we should now cease to regard the action of the salts of cinchona or quinia in malarial fevers, as in their nature *specific*—which term was equivalent to an acknowledgment that we did not understand it. For the researches of Dr. H. Stuart, of this State, and his own repeated series of observations upon Intermittent and Remittent Fevers, have convinced him that it was, perhaps, sufficiently explained by their positive influence as renal depurants of phosphates, urates, purpurine, bile, and other products of hepatic derangement, as well as of the poisoned blood. The discharge of all these the salts of quinia and cinchonia facilitate, which, when accomplished, is generally coexistent with recovery. These efficient remedial agents, probably, affect these important results when absorbed, by their primary influence upon the nervous matter—pneumogastric or ganglionic—upon which the action of the glands and the entire capillary system is dependent. The primary influence of sulphate of quinine upon the nervous matter is marked, affecting the nerves of audition, and producing a decided effect in cases of neuralgia, and giving tone to the nervous system even when given in small doses, thus acting as a tonic. Its complete effect, as an eliminatory agent, is attained when large doses are employed, when its full power as an antiperiodic is secured. Chlorate of

potash and other agents of this class, now so largely used, undoubtedly act upon the glands and upon the blood during the process by which they are excreted.

The pursuit of these investigations has, also, enabled the writer frequently to detect in the renal excretion, substances which had been administered internally, as iodine after iodide of potash, etc. And even after the tincture of iodine had been applied externally over the entire surface of a leg, he has been able clearly to recognize it, after a certain time, in the discharges from the bladder. (See examinations in the body of the Essay.) Thus proving absorption through the skin, and throwing doubt upon the conclusion deduced from the experiments of Rousseau, Dangerfield and others, which taught that the *only* mode of admission into the system of agents applied externally, was by emanations from them received into the lungs. *Vice versa*, I have detected, by the usual tests, the bichloride of mercury externally in a discharge from a syphilitic ulcer, after it had been for some time administered internally—all of which was demonstrated to students attending the Marine Hospital in this city.

It would seem strange, perhaps, that I should be required to offer further arguments for the possible utility of studies, microscopical or chemical, which have engaged the attention of some of the most distinguished minds in Europe and in this country; yet there exist those who do decry their utility in any particular.

Certainly, this is not the place to introduce a defence or farther plea for such examinations; but, setting aside the convictions resulting from my own daily experience, and my somewhat extended opportunities of forming an opinion, I would ask one question: Is it productive of no satisfaction or advantage for the physician to have definite and correct notions concerning excretions and secretions, to which his attention is occasionally attracted by their unusual appearance; and when, before minute scientific examination, he is frequently in doubt whether

that appearance is owing to the presence of blood, pus, mucus, oxalate of lime, uric acid, albumen in excess, or simply to the existence of a large amount of the phosphates caused by an indigestion? Some of these, undoubtedly, are significant of grave organic lesions, whilst the others are comparatively unimportant. I would ask whether the presence or absence of any or all of them is a matter of supreme indifference to the practitioner? Mialhe considers the escape of albumen, or albuminose, in excess, as always an indication of some lesion of structure, and, of course, very different from the mere deposit of crystals, thrown down from urine containing salts, previously dissolved by the large proportion of water present. ("*Chimie appliquée à la Physiologie et à la Thérapeutique.*") So blood can sometimes be discovered only by the microscope, and, before examination, is often confounded with the red urates and uric acid stained by bile and purpurine. The same is true of many other substances; the distinction between mucus and pus, for example, is with difficulty, if ever, made out after all the appliances of art are brought to bear upon them; yet, the detection of either, which can readily be accomplished, will always reward the attempt. How often has the writer been appealed to to determine the precise nature of secretions which, by their appearance, gave rise to uneasiness in the minds of both patient and physician, and an answer, favorable or unfavorable (in some cases violating all preconceived opinions founded on a mere casual inspection), either set at rest all disquietude, or confirmed the justness of it. Even a few drops of nitric, or other strong acid, will disclose the presence of an enormous amount of albumen which had escaped from the blood itself, but held in chemical solution in a perfectly clear fluid, not suspected, before the application of such test, to be in any degree morbid. I have seen a person, for example, dying from the excessive drain caused by the escape of albumen, after apparent recovery from an attack of Yellow Fever, with the renal excretion *seemingly*

perfectly natural, till the requisite examination disclosed the enormous amount of albumen held in solution. He was dying of the albuminuria. Not to multiply examples of this character, we may safely assert that every circumstance connected with the sick is important. The pulse, tongue, general appearance, heat of surface, injection of eye, contraction or dilatation of pupil, amount of perspiration, etc., etc.; so, also, are the excretions and secretions. If it is entirely useless to examine into the nature of any unusual amount of substance present in the renal excretion, in order to assist in ascertaining whether the bladder, urethra, or kidney is at fault, why, then, does the careful physician think it worth his while to enquire as to the physical appearance of the fecal discharges—whether watery, bloody, purulent, bilious or natural? Why does he seek to obtain clearer and more accurate insight into the nature of any outward phenomena, seemingly the result of morbid processes hidden from his view? I do not think it complimentary to the Association to proceed much farther in this direction, but will call to my assistance the opinions of others.

And, first: of the utility or *essential* importance of the *microscope*, itself, in clinical studies. Under article "*Microscopie*," in Nysten's "Dictionnaire de Medicine," M. Robin, probably, uses this language: "La microscope n'est pas pour le biologiste et le Médicin un instrument d'ont, suivant sa volonte, il peut indifféremment ou se servir ou se passer. C'est un instrument d'ont l'employ est parfaitement déterminè. Il est destiné à nous faire connâitre un ensemble considerable de parties appartenant aux êtres organizés; parties d'ont l'étude ne peut être suivie à l'œil un, ni à l'aide d'un autre instrument. Il est indispensable; etc., etc. Mais pour le Médicin ce ne sont pas là des objets de simple curiosité; il à en vue leur utilité dans tel ou tel appareil, leur rôle dans tel ou tel ordre de fonctions, à l'etat normal et à l'etat morbide."

In order to show, to those who will not listen to any but voices from abroad, that some examination is often

useful, I will quote, from several authorities, the following rather miscellaneous remarks. "This deposit," when speaking of the urates, stained red by the coloring principles, urrosacine, etc., "is often taken by the naked eye for pus or blood, and it is not infrequent to see the sick treated in consequence." (Nysten's Dictionary, article "*Sediment.*")

"The condition of the urine in these cases," whilst referring to cylindrical fibrinous casts of the urinary tubes appearing in acute desquamative nephritis, "is clearly indicative of the process going on in the kidney." It is only by microscopic examination that we could be aware of this coexistence. (See article "*Ren*," by Dr. Johnson, in Todds' Encyc. of Anat. and Physiol., Part IV, p. 258; also, Dr. Todd's paper in Medical Gazette for June, 1847.)

"The microscopical and chemical characters combined supply, however, the real evidence from which their composition is ascertained." (Walter Hayle Walshe in Todd's Anat. and Physiology Encyc., Part IV, p. 75; article, "Products Adventitious.") In same paper, also, it is stated by Dr. Walshe that: "The rarity of oxalate of lime crystals in urinary deposits was matter of received opinion, until the enquiries of Dr. G. Bird led him to the inference that in the cases of disease occurring in London * * * the oxalate is of far more frequent occurrence in urine than the deposit of earthy phosphates." (Toc. cit., p. 79.) Certainly, the reverse is strikingly true in the *ferers* prevailing in this city (Charleston), as an inspection of the drawings in this paper will demonstrate. See, also, Statistical Tables, Nos. 1 and 3. So, also, greater experience and deductions from more ample data, have corrected the assertion by Berzelius: of a general law that uric acid was the chief material in the urine.

Dr. Walshe, also, has called attention to the same fact observed by others, that: "An abundant precipitation of phosphates, with mucus and epithelium, will sometimes

produce an appearance most strangely like that of pus—the microscope and the addition of a little acid, readily settle the nature of the deposit." In the hands of the writer, the microscope has repeatedly corrected impressions calculated to lead astray, derived from the phosphates and urates mistaken for pus and blood, as well as a large amount of purpurine for the latter.

In a clinical lecture, by Dr. George Johnson, published in the *Medical Times and Gazette*, on "Albuminuria in Typhus and Typhoid Fevers," he says: "It not unfrequently happens that during the progress of Typhus and Typhoid Fevers, the urine contains one of the constituents of blood. The secretion may be simply albuminous, in a greater or less degree, or it may contain a notable quantity of blood. A deep blood-tinge of the urine is not likely to escape notice; but the urine may be very scanty and very albuminous, without any striking change of color" (as the writer has observed in Yellow Fever, also), "and in such cases, if your attention has not been particularly directed to this circumstance in the natural history of fever, a very serious complication may be entirely overlooked and, therefore, left without remedy. I shall, probably, have repeated opportunities of pointing out to you the complications of Typhus and Typhoid Fevers with renal congestion, a scanty secretion of albuminous urine, and the early occurrence of drowsiness passing into deep coma. In the meantime, bear in mind this practical advice: During the progress of Typhus or Typhoid Fever, make it a point to examine the urine either daily or every other day, and test it for albumen. This can be done with so slight an expenditure of time and labor, that the neglect of it is inexcusable. If you find that the urine is becoming albuminous, and at the same time scanty, be sure that serious head symptoms will speedily appear, and give your prognosis accordingly; remembering that *cæteris paribus* the danger is great in proportion to the scantiness of the secretion of urine and the amount of albumen; greater, too, when

this complication occurs at an early period of the febrile disease than when the malady is more advanced," etc. Dry cupping to loins, etc., etc., advised.

Dr. Anthony White (late President of the College of Surgeons), in his paper on "Gout," Medical Gazette, August, 1848, remarks: "And the most we can venture to assert is, that the renal functions, in common with others, are secondarily affected by the cause, whatever it be, of the gouty diathesis. I think it the more necessary to insist on this point, as it is one on which so acute and lucid a reasoner as Dr. Holland appears to have fallen into error. "The kidneys," he says, "are evidently the organs of the body, upon the disordered or deficient action of which depend those changes in the circulating fluids which have the closest relation to all the phenomena of Gout." He would, I think, have been nearer the truth if he had said that "the kidneys are, of all organs, those whose secretions afford the most faithful, and the most readily discernible evidence of the changes aforesaid." (Also, Braithwaite's Retros., p. 39, Vol. XVIII.)

The writer has only within the last few days seen Golding Bird's paper on the "Depuration of the Blood," from which he quotes as follows, to corroborate his own views, long since published in the Charleston Medical Journal and Review, on the coexistence in certain fevers of amelioration and recovery, with critical discharges:

"An illustration, also, of another fact, and a very important one, to which I have already alluded—that a direct ratio exists in certain diseases, between the excretion of a definite portion of effete matter from the blood and the amelioration of the patient's condition, such amelioration being *protanto critical*." He then relates two cases of Ague, in which the amount of solids excreted in the urine was ascertained at regular intervals during the treatment. "It was found that their amount increased in the ratio of the improvement of the patients." Did space permit, I could quote nothing more *apropos*

than the continuation of Dr. Bird's views respecting the connection between these critical discharges and the true nature of the diseases themselves. My own series of observations are only confirmed by the above. (Consult Charleston Journal—papers, respectively, on the Pathology and Treatment of Yellow, and on Remittent and Intermittent Fevers.)

Bird also says: "That the kidneys can depurate the blood, not only of matters generally regarded as proper to their function, but of substances which it is the normal duty of other emunctories to separate from the animal organism."

I quote, again, from Dr. Bird, Braithwaite's Retrospect, Vol. XXVIII, as confirmatory of what I before stated: "I am anxious to announce to you a new fact; one which bids fair to be of great importance in the treatment of disease, and one which, I believe, has never yet been announced, and which the examination of the urine secreted under the influence of remedies, has led me to discover. It is, *that we possess remedies which, when administered, remarkably increase the metamorphosis of tissue, and enable us to produce at will the very depurative effects which I have pointed out to you as resulting normally in the course of certain zymotic diseases.* In taking a practical view of the so-called diuretic agents, it will now become necessary to divide these into two classes: the one including those which simply increase the bulk of the urine; the other those which act as *renal alteratives* and aid the depuration of the blood." As I said before, I have only read the above for the first time since these introductory remarks had been thus far already written, though I have long been a careful student of Dr. Bird's larger Treatise. Indeed, these pages have only been interpolated here since the beginning of the present year (January 4th, 1860). (See my own series of cases in this paper, under the collection entitled: "Intermittent and Remittent Fevers," where the relation between the *stage* of the fever and the matters excreted is attempted to be established by careful examinations—microscopical and chemical.)

I think it not inappropriate, to that portion of the subjects of this Essay with which I am at present occupied, to quote the following from the late Dr. Charles Frick's lecture on "Diuretic Remedies," before the medical class of the University of Maryland, February, 1860. It shows the action of certain remedies upon the blood, thereby modifying the excretions and acting as renal depurants. These and other extracts which follow from recent authorities, published since this Essay was accepted by the Association, I introduce, as they all tend to explain doctrines which are most practical in their results, and which now occupy the public mind. They constitute, at least, *one* of the advance columns in which the most recent spirit of research is now pushing forward. I may bring up those made in other directions, also, preparatory to a full comprehension of the entire field, that as many elements as possible of the problem of disease may be seen at a view. These will contain the collateral progress made in therapeutics, also. Physiological chemistry has been much reviled even by those high in authority; but, with its aid, the best advances are made in rational practical medicine. It is so intimately connected with the latter, a distinguished cultivator in this country (Professor W. A. Hammond) remarks: "As to exercise a very material influence upon the views of those physicians who act in accordance with facts rather than fancies, and, as a consequence, has modified to a considérable extent the practical application of medical principles." Witness the researches of Liebig, Kœlliker, Lehman, Virchow, Bernard, Sequard, Mialhe, Day, and others. Dr. Frick says:

"You are aware that the fibrine of the blood—the coagulable element—undergoes various changes in disease, both as regards quantity and quality. So far as its quantity is concerned, a vast increase is noted in inflammatory and certain other morbid conditions, among them Rheumatism, in which the absolute amount becomes tripled, and even quadrupled, above its usual healthy

standard. * * * I hold that this increase is rather the result of retrograde than of formative changes. There are others, however, who maintain a different view, and think the large amount of this fibrine in the blood which, as I just said, is one of the characteristics of acute rheumatism, is the cause of many of the phenomena of the disease; and as the alkaline salts have the property to a very great degree, when given in large and continuous doses, of destroying the plasticity of the blood, and diminishing the quantity of fibrine it contains, would assume that the benefit derived from these remedies is due to this fact. This may be so; but whether correct or otherwise, I am satisfied that all the good effect exerted is not in this mode. Not only do the alkalies lessen the fibrine, but, like mercury, they increase the waste of tissue, as well as of the elements of the blood itself, and, when disease is present, the morbific principles that this fluid contains. It is in this way that it (bicarb. potash) proves beneficial in Rheumatism, and is preferable, as you have seen, to both the carbonate and acetate, as it is less irritating, and to mercury because it is more manageable. But, in the treatment of this disease, it is necessary that it should be administered in large doses—at least 30 to 60 grains every two or three hours, if the stomach will bear it. It is, of course, inapplicable to cases of Rheumatism occurring in debilitated and ill-nourished individuals, and is, therefore, not a specific for it, as many of its advocates would seem to imply. It will be noted, also, that under its use when it acts favorably, the quantity of urine becomes increased, and there is, also, an additional amount of solid material contained in it. It is, therefore, in one sense a diuretic, but I beg you to recollect what I have stated, more than once, that this increase is not so much owing to stimulation and increased function on the part of the kidneys as because the remedy has produced additional waste, and has, therefore, provided more material for these organs to excrete." These remarks may equally apply

to all remedies of this class, viz: chlorates, acetates, and citrates of potash, carb. of lithia, etc.

Dr. Alfred Stillé, also, in his excellent treatise on the Materia Medica and Therapeutics, recently published, very nearly, if not entirely endorses these views, as follows—Vol. II, 641, article "Diuretics," I quote from him, also, as collateral authority to strengthen the position long since assumed by myself—"Formerly, a great many diseases were held to depend upon an acrimony in the blood. By this term was understood certain particles which, by their shape or their chemical action, irritated the tissues, and thus gave rise to the local phenomena of disease. However plausible this doctrine may have seemed, it has not the support of the actual observation of any such morbid agents, nor of any arguments, by the way of exclusion, which prove the necessity of their existence.

"The effects of miasmata and various more tangible poisons we are acquainted with, and the probable explanation of their morbific agency, is that they act upon the blood catalytically, or in the manner of a ferment. As regards many diseases, it may be assumed that they arise from *a retention in the blood not of substances essentially foreign to it, but of some which have assumed a new form*, rendering their presence in the system incompatible with health. In other words, they are the excrementitious matters of nutrition. As, next to the fœces, the urine of all the excretions contains the largest proportion of such substances, a diminution of the quantity of it excreted necessarily involves a greater or less deterioration of the blood, and its renewed or augmented discharge as necessarily tends to the purification of the vital fluid, provided that the proportion of solid effete matters contained in it equals or exceeds the normal quantity."

Dr. S. fully sustains the views of Bird and others as to the material value of renal depurants.

"It seems probable, therefore," he adds, "that they decompose, destroy, and eliminate a material morbid cause

circulating in the blood, or, what is quite as probable, that they promote the elimination of the effete substances which *have been produced by the action of that morbid cause*, and thus literally purge the capillary blood-vessels of the noxious materials with which they are loaded, and which interfere with all the processes of a healthy nutrition. It seems to be a rational opinion that every disease, and especially every febrile disease, is attended with an increase of the destructive processes proper to the economy, while the organs destined for the elimination of the resulting substances become engorged, and unable efficiently to continue their function." (The italics in the above are my own.)

In continuation of this subject, and as Intermittent and Remittent Fevers form an important subdivision of this Essay, I quote here a paragraph somewhat modified from my paper (Charleston Medical Journal) on "Sulphate of Cinchonia as a substitute for Quinine," in reference to their action in malarial fever. No effort is made to show the nature of malaria, but only some of its effects:

"Malaria (whether dependent upon ozone, electricity, cryptogamic plants, chemical compounds, gaseous or other, the product of decaying *vegetable* substance under the combined influence of heat and moisture) is but remotely the *cause* of the phosphates, urates, bile, purpurine, high color of urine, increased heat and vascular action, etc., which characterize these fevers. Such phenomena *result*, I suggest, from the influence of the cold stage—*the disease in action*—upon the central organs, glands, digestive track and capillaries, which are known to be congested. The nerves and nervous centres, dominating all, are, perhaps, primarily disturbed; and quinine only cures by its action on the nerves which specially incite the capillaries, promoting a tonic and detergent influence which *results* in throwing out the products of waste of tissues, the products resulting from alteration or excess in the elements of the blood, of combustion, etc. By these means the materies morbi, the effects of the disease,

nay, the cause itself if it is material, may be eliminated, and the disease put an end to. It *may* accomplish all this by its sole, direct action on the nervous matter. Thus, also, it may anticipate and prevent the chill when taken by one exposed to malaria, by its continued action on the nervous media; also, by keeping up an influence in the capillaries, resisting or antagonizing the morbid influences produced by the malarial poison, and eliminating the products of the latter in the blood as they are produced."

To continue from my paper: "Quinia acts almost in as purely physical a way as narcotics or any such agents. It contains, or is, a principle capable of acting, perhaps, directly upon the nerves, and also of being received in the circulation by absorption; of penetrating the ultimate arterioles and venules constituting the capillaries throughout the system, including the brain, and thus acting upon the cerebral substance and nerves proceeding from it, by which they have increased energy imparted to them. It thus causes increased activity of function; so that the products of waste of tissues (whether as the cause or the result of chill), including phosphates, urates, saline of coloring matters in the blood and liver, are thrown out of the system. This being accomplished (aided, if necessary, by calomel, opium or stimulants), periodical agues and chill, caused by malaria, and giving rise to these accumulations, generally disappear. They are liable to return when there is reaccumulation of these products by the presence of some of the cause still remaining—to be removed by a repetition of the same course. And I believe that sulphate of cinchonia possesses similar powers, but, perhaps, to a less degree. For sulphate of quinine to enter the system, it requires the intervention of the gastric acids, as it is a basic compound, and hence we very properly add a little sulphuric acid to mixtures containing it, to render it more soluble. For it is quinine itself, says Mialhe ('*Chimie appliqué*'), which produces its dynamic action, from whence results a lowering of

the temperature, stupor of the senses and general prostration, and not its saline combination, as when we give it, for example, in the form of a salt—the acid with which it is united only serving as a vehicle for its introduction into the blood. 'There it is,' adds Mialhe, 'that quinine, placed at liberty by means of the alkaline carbonates, exerts its action as a modifier.' I may observe here the general principle: that pressure being removed by all agents which lessen the heart's action, they favor excretion and exhalation. Quinine, besides this effect of *large doses*, is, *also*, in *small doses* strengthening and tonic, and contracts capillaries; but I think that even the first-named result, viz: its power as a depuratory agent, depends rather upon its tonic influence upon the nerves, and that this increases capillary action. Large doses are oppressive, because approaching to the character of a poison, and morbid sensibility is manifested."

The galvanoid and electroid influences acting upon the capillaries through the instrumentality of the nervous media, the contraction and expansion of the capillaries, and the sources of increased animal heat during fevers and inflammation, dwelt upon by Billing and others, I may again refer to, as they are particularly important in this connection.

Dr. Headland thinks that "some diseases may be cured in two ways; either by the supply of something, or by the neutralization of something else," and he suggests that Ague is perhaps one of these. "And it is not repugnant to what we know of Ague to suppose that there is in it a want of some natural material which would have, when present, the effect of checking the operation of the morbid agent. The fact of having had Ague once does not, as in the case of the eruptive fevers, protect a man from the disorder thenceforward. So, in this sense, all persons may be said to be liable to Ague, and none protected from its assault. But it is not the case with Ague as it is with Syphilis and Small Pox, which diseases most persons inevitably catch who are exposed

to the virus for the first time in their lives. For, of a number of persons exposed to the same malarious influence, only a part take the disorder; some escape. It is generally found that those are most likely to take it who have been previously debilitated by any cause; so that we must suppose that the rest have in their blood some material which serves to prevent the working in it of the Ague-poison, which apparently must enter it. It is not unlikely, then, that Ague may be cured by supplying the want of this material."

He goes on further to state more precisely, that there is in that part of the bile which is absorbed into the blood, a crystalline substance bearing a resemblance, in several important points, to the bitter alkaloids. "It is discovered, by careful experiment, that quinia, when taken in moderate doses, is not excreted from the system, but retained in the blood like its analogue taurine. It being thus shown that quina adds something to the blood, and it being granted that it cures certain disorders, a presumption is lastly established that these disorders are connected with some deficiency in the blood, which may be supplied by such an agent."

The views on this particular subject presented by this author contain little more than a speculation, yet I will quote them here in this connection, as it may serve to build up some more correct theory:

"I have already made use of one of the principles of the bile, for the purpose of showing that among the natural constituents of the blood there is a substance which chemically resembles a tonic alkaloid, like quina. This similarity admits of a further and more distinct application.

"It is ascertained that many, if not all, of the diseases in which quina and its kindred medicines are found to be of use, are connected with a derangement of the secretory functions of the liver. One of these diseases is the debility which is consequent upon Typhoid and other fevers. In these fevers the function of the liver is al-

ways more or less interfered with, though more obviously in some cases than in others. In strumous habits—in which, generally, bark is of signal service, and was very strongly recommended by Cullen, Fordyce and others—there is found commonly a peculiar degeneration of the liver, which has been ably described by Dr. G. Budd. This state is distinct from the fatty enlargement common in Phthisis, in the early stage of which disease quinine is also very serviceable.

"Quinine is often beneficial in Gout, in which the liver is always more or less deranged. (A celebrated nostrum, the 'Portland Powder for the Gout,' contained another bitter—gentian.)

"Turning to periodic diseases, we find that impaired hepatic functions are the rule, and the absence of such disorder the exception. This will be at once admitted in the case of Dysentery, and of the Remittent and Yellow Fevers of the Tropics. It is also true of Ague. It seems even likely that the enlarged spleen may be partly caused by an obstruction to the circulation in the liver. This affection of the spleen is not uncommon in other liver diseases.

"In Typhus Fever, both the spleen is disorganized and the liver deranged. It is observed in tropical countries that severe forms of remittent not unfrequently pass into continued fever, which seems to point to some analogy between the two. Ague, even, may pass into Typhoid Fever. And quina has of late been strongly recommended in the treatment of continued fevers in general.

"Dr. Watson states that in New Zealand the biliary functions suffer so much in the Intermittent which occurs there, that it is known among the inhabitants by the name of the 'Gall-fever.' (Lectures on the Practice of Medicine, Vol. I, p. 793.)

"Asiatic Cholera is considered by many physicians to be a kind of terrible intermittent, which seldom lasts beyond the second (or cold) stage. The secretion of bile is completely arrested during the con-

tinuance of the rice-water purging. Quina has been tried in Cholera, and the beneficial results have been sufficiently marked to encourage us to give it a more extensive trial in the event of another visitation.

"Let us now place in conjunction with these facts, the similarity which has been pointed out between the bitter vegetable principles and one of the chief constituents of the reabsorbed bile. Quina and others resemble in many points a certain principle in the bile; they tend to cure certain diseases, and these diseases depend on deranged hepatic functions. Does not this suggest the possibility that they may be of service by actually forming the above principle, or by supplying its place in the blood? It is possible that such bodies as quina and cinchonia may be able to fulfil the function of bile in the blood by remaining as they are, without even changing at all.

"It is just possible that the presence in the blood of the bile-product, the supply of which has been cut off by the hepatic disease, might have prevented the continued action of the ague-poison.

"There is another fact which gives additional probability to such an idea. Another remedy of a different kind has been used in all the diseases in which quina is admissible, proving in some cases superior, and in other instances second only to it in its beneficial action. This is mercury; used in Remittent and Yellow Fevers; of the first importance in Dysentery; employed by Dr. Baillie in Ague, and pronounced by him to be in some cases superior even to quina. In small doses, it is frequently of use in cases of Debility and Scrofula. And mercury is a cholagogue; *i. e.*, an agent which is known to have the effect of promoting the secretory function of the liver. Thus we may conceive that mercury, not given in excess or to salivation, may operate in a different way to produce the same end as quina. One explanation would suffice for both.

"If this connection between tonics and the bile were

actually established, then we should be enabled to explain a matter which would otherwise seem difficult to understand; how it is that small doses of mercury may sometimes act as tonics, though we know that the ultimate action of this medicine, like that of other catalytics, is to deteriorate the blood. Even in scrofulous and enfeebled cases, small doses of blue pill or of calomel are often signally useful; and not prejudicial, as is sometimes stated by those who confound their application with that of mercury given in salivating doses. Under such a course, when judiciously enforced, we may see the dilated pupil contract to its normal size, and the pale, enervated countenance become rosy and lively, and feel the weak, compressible pulse become hard and firm. Perhaps mercury in such a case may be, indirectly, tonic, by restoring to the blood the natural tonic principle of the bile."

Alkalies, and particularly soda, which are so important in fevers and other disorders where the biliary functions are deranged, it will be remembered, enter largely into the composition of bile; and hence these agents may perform a much more important *rôle* than simply the neutralizing the too excessive production of acids usually accompanying depraved condition of the gastro-intestinal surfaces during fevers. They act, in other words, as succedanea for principles important to the healthy economy, the production or secretion of which is arrested by disease. I may refer, in passing, to a valuable paper on the alkaline agents, by Dr. Andrews, published in the Chicago Journal, February, 1859, and translate the following from M. Mialhe, which is commended to the consideration of the reader:

"'Alkaline agents (of which the preference is not important, potash being quite as good as soda,) give rise to and disengage ammonia in the system. * * * The alkalies, by reason of their importance in the natural phenomena of decomposition, of absorption, of oxidation of sugar and starchy substances, of fatty matters, oils and resinous substances, are at the head of the most

useful and much used medicines. They maintain the blood in its necessary degree of viscosity, fluidify its too great coagulability, increase circulation, dissolve the principal elements (albumen and fibrine) which constitute the bases of nearly all engorgements. They liquify the elements of the bile, prevent them from becoming thick, from concreting together, from forming calculus. They reanimate and regulate intestinal digestion; facilitate the secretions; saturate the acids, which, taking their origin within the economy, can, through their excess, occasion disease:' Such as Gout, Rheumatism, Diabetes, or those insoluble collections constituting chalky concretions, urinary calculi, deposits, etc."

I hope to give increased prominence, at some future time, to a remark from Becquerel, referred to by Dr. Stillé, on account of its bearings upon the *prevention* of *some of our epidemic and endemic zymotic diseases.* Becquerel first observed that even in health, the quantity of solid food remaining the same, the amount of solid matter in the urine is somewhat increased by increasing the quantity of water used as a drink.* A statement fully confirmed by Bird, "who explains by its means the efficacy of mineral springs famous for their curative influence in chronic disorders, and which are but little, if at all, mineralized."† Dr. Rush, himself, referred to the prophylactic influence of purgatives taken at the inception of Yellow Fever, which always begins with constipation; and I am not only prepared to learn that slightly mineralized artesian waters, however mildly impregnated, will prevent the spread of Yellow Fever and other blood diseases by their slow, but constant, eliminatory action upon the blood through the glands, but I have long since *published* (Charleston Medical Journal) a suggestion, which I await an opportunity more fully still to test, that artificial saline diuretics will be found to be highly efficient for the same purpose. Their depuratory influence upon the

* Séméiotiques des Urines, 1841, p. 140, and Stillé, Vol. II, 642.
† Stillé, loc. cit. sup.

glands may retain the blood in a condition of health, by eliminating the *materies morbi* of contagious disease as fast as they accumulate in the system of those exposed to the influences which give rise to such diseases, and thus act as prophylactics. A course of bicarbonate or citrate of potash, appropriately combined with quinine, perhaps, and an occasional laxative, may prevent, in the opinion of the writer, the inception or maturation of Yellow and Scarlet Fevers! No more remarkable than that quinine wards off the incursion of Intermittents—which is admitted. Even so apparently vulgar a popular idea as that which exists, that the free use of molasses on our plantations prevents the spread of Typhoid Fever, I would, from theoretical grounds, not be inclined to reject too hastily.

To show the probable mode of action of vegetable acids in fever, I quote from Headland ("Action of Medicines," third edition, p. 150). It gives some color to the project for preventing the depraved condition of the blood in fevers and zymotic diseases, by certain eliminatory agents:

"In many febrile cases it is found that diluent drinks containing the free vegetable acids, act beneficially in lowering the pulse and in moderating the progress of the disorder.* These should be distinguished from saline drinks, whether of mineral or of vegetable acid salts; for salts, from their known effects on the blood, would seem to belong simply to my division of catalytics. But the effect of these vegetable acids seems to be to restore the blood to a more natural condition, and this independently of the action of the diluent with which they are administered. It would seem that in such cases the free vegetable acid acts as a restorative. In fevers of a low type, where there is a tendency to alkalinity, the vegetable acid may act directly by neutralizing alkali in the blood. But in sthenic fevers, also, it

"* It is right to state that this is doubted by Dr. Maclagan and others. But on the other side are Dr. Pereira, and the majority of therapeutists."

seems possible that this organic acid may step in as a substitute for lactic acid, the natural fuel of the system. In fact, I suppose that in fevers the supply of this natural blood fuel is deficient; that the nitrogenous tissues are then consumed to maintain the heat of the body, causing not only wasting, but tending to keep up the fever by the excessive amount of oxygen demanded for this abnormal combustion; that in such a case the vegetable acid is well adapted to take the place of lactic acid, the material which is ordinarily oxidized in the system to maintain the animal heat. For though in health the ingestion of such an acid is immediately followed by increased acidity of the urine, when used in fevers it does not pass into the urine. It is then disposed of, or burnt, in the blood. The alkaline salt of the same acid is similarly burnt, as it would be in health; but it leaves a residue, an alkaline carbonate, which exerts upon the system the usual operation of an alkali.

"It has long been considered probable, but may now be said to have been proved by the researches of M. Becquerel, that in febrile disorders and inflammations there is excreted in the urine an excess of urea and of urate of ammonia—substances which are formed by the oxidation of nitrogenous tissues. This extra-oxidation probably arises from a deficiency of that matter which is the proper food of oxygen in the system. This, as we have seen, being the step between grape-sugar and carbonic acid, must either be lactic acid, or something similar to it. It must be remembered that no food is usually taken in fever; this would at length quite cut off the usual source of this lactic acid, which is the starch and sugar of the food, and render it necessary that the animal tissues should continue to undergo oxidation, to maintain animal heat. (Rheumatism and Gout are an exception to this.) If we compare the commonly received formula of proteine with those of lactic acid and tartaric acid, it will at once be seen, as was pointed out some time ago by Dr. Murray, that the latter contain

more oxygen, in proportion to their carbon and hydrogen, than is found in proteine or albumen.

Proteine $=C_{40}\ H_{31}\ N_5\ O_{12}$.
Lactic acid $=C_6\ H_6\ O_6$.
Tartaric acid $=C_8\ H_4\ O_{10}+2$ HO.

Thus, while for 40 equivalents of carbon proteine contains only 12 of oxygen, lactic acid contains 40, and tartaric 50, of that element. So it seems that albuminous matters, containing less oxygen, would require much more oxygen for their combustion; this would produce more heat, augment the number of respirations, and keep up the fever. And though it has been proved by Wöhler that free vegetable acids pass out in the urine without having undergone oxidation, yet the condition of fever would probably be an exceptional case. Lactic acid, the natural fuel, being deficient, the alkali with which it should combine must be present in some excess; so it seems likely that a free vegetable acid would combine at once with this alkali as the lactic acid would have done, and thus be burnt or oxidized instead of the latter. Accordingly it has been observed, by Dr. Rees and others, that the use of these acids in fevers and inflammations is not followed by increased acidity of the urine. The action of such an acid is then simply restorative. Requiring less oxygen than the proteine would need to transform it into carbonic acid, it would thus diminish the number of the respirations, the frequency of the pulse, the temperature of the body—and in this way allay the fever. It would be strongly confirmatory of this idea, if it were proved that the amount of urea and urates in the urine is actually diminished by the use of acid drinks and fruits in febrile cases. This hypothesis can only be admitted on the supposition that fever (in which there is likely to be in the blood an excess of uncombined alkali) constitutes an exception to the general rule that the vegetable acids pass through the blood without undergoing change.

"Now, the salts of these acids with alkalies, which are often administered in the form of effervescing draughts, might exert the same refrigerant action. But there would be this difference: the alkali of the blood would not be required, the acid being already combined with an alkali. M. Wöhler has found that these vegetable-acid salts always undergo oxidation in the system—being converted into carbonates or bicarbonates, and thus reacting on the secretions as alkalies. And so in the same way it seems that the natural lactate of soda is formed into a carbonate—the carbonic acid being afterwards freed from the base, to be excreted by the lungs. By this natural process the quantity of alkali in the blood would not be increased, nor would it be augmented by the action of a free vegetable acid. But the change undergone by a salt of this acid would continually add to the alkaline matter already in the system. And as alkalies have a catalytic action on the blood, which may prove useful in some sthenic fevers, it follows that these salts have a double action, and are not simply restorative.

"Rheumatism and Gout differ considerably from other fevers, both in their nature and in the remedies which they require. They are produced by special morbid poisons or agencies, which we are enabled to counteract by certain catalytic medicines. There is in both of them an excess of free acid formed in the system. Here alkalies are the remedies mainly indicated, for they neutralize the acid. Some obscurity rests upon the subject of the use of citric acid in Scurvy; but as it seems to partake rather of the nature of a catalytic than of a restorative action, I have placed antiscorbutics in the second division. It appears likely that the catalytic action of the vegetable acids consists in a certain ill-understood control over the progress of various cachexies and blood-degenerations. Among others, it has been asserted, apparently upon a reasonable amount of evidence, that they afford a sort of exemption from liability to Asiatic Cholera.

In a paper by Dr. J. L. Teed, of Mendota, Ill., in the Am. Jour. Med. Science, April, 1860, on "Animal Chemistry in its relation to Therapeutics," and in another on "Fever and Inflammation," in same journal, April, 1861, I find a true view, I think, of the elements of the complex problem involved in the causation and nature of diseases, and their treatment. I interpolate the following (July, 1861), as it fully endorses what has been before advanced:

"The rational physician will, therefore, use experience as his guide, when he has no better; but he will, at the same time, endeavor to extend his knowledge of the *modus operandi* of remedial agents, of the nature and properties of the organism, and of the laws governing it in its whole and in its varied parts, and of the variations induced by external or internal causes. By these means experience, when correct, will be confirmed; when erroneous, will be corrected."

"The chemistry of the tissues is another and an important division of this subject, and one which hardly needs more than mention, as it must be evident that the most minute acquaintance with the composition of any body, in its whole and in its parts, is a necessary prerequisite to its complete study. The metamorphosis of tissue is so intimately connected with two other divisions, viz: the chemistry of food and the chemistry of the excretions, and when to these have been added the chemistry of the secretions and of nutrition, the importance of the subject looms up before the mind in its vastness and sublimity; the force of the nervous system capping the whole, and impressing the reflective mind with its unspeakable grandeur."

Dr. Teed gives an account of the nature of disease and the indications for and mode of action of stimulants, alkalies, mercurials, etc., very much in accordance with the views long since expressed by the writer. I quote the concluding paragraph of his last article:

"The present state of physiology has been attained chiefly on the foundation of animal chemistry; for, although the microscope has revealed the minute structure, we have not

been able to gain thereby a definite idea of the function of the part; but by learning more and more fully the chemical characters of each secretion, and by carrying the investigation into the laboratory, we have obtained information which has yielded valuable results. The same plan in pathological physiology will add greatly to them, and when observers shall take the vito-chemical stand-point, medicine will progress as a science and as an art."

I find that Dr. Teed also lays equal stress with myself on points upon which I had touched when this paper was prepared. It is all very rational, and comports with what we know of the requirements of the system in disease. He says, in his paper on "Animal Chemistry":

"In the case of the pyrexiæ" (fevers), "the utmost importance attaches to a correct understanding of the chemical changes which should occur in health, and which do happen in the disease, and to the influence of remedial agents in preventing, counteracting and removing those morbid products which keep up the disease, and by their presence and decomposing influences induce still farther disorganization. The treatment of fevers is essentially a chemical process. We use evacuants to remove accumulations of effete matter, and thereby purify the residue; we act on one organ to relieve the system of matters which should have been discharged by another; we adjust our supplies of nourishment to the capabilities of the system to assimilate; we supply stimulants to maintain the nerve-force under depression. * * * We examine the excretions with the view of finding their chemical constitution, and the knowledge of the chemical changes induced by remedial agents enables us to understand the success which follows seemingly opposite modes of treatment; the better we are acquainted with animal chemistry, with the greater facility shall we be enabled to adjust our treatment to the exigencies of the case, and the greater will be the success attending our efforts. The knowledge of the *modus operandi* of our remedies is similar to the acquaintance with reagents of the chemist, and the more they are understood the less shall

we be guilty of 'pouring medicines of which we know little into a body of which we know less.'"

This passage was strikingly foreshadowed by what was written in the earlier portions of this Essay—and I quote it partly to show how general these doctrines are becoming.

My object is to suggest clues of thought to others, if I cannot instruct; therefore, though my interpolations since this Essay was received may give an air of patchwork and a desultory character to these introductory remarks, I add still the following from the Am. Jour. Med. Sciences, April, 1861. They all show the drift of thought of intelligent observers in both hemispheres:

Dr. Morland, of Boston, in his Fisk-fund Prize Essay on Uræmia, in referring to Dr. Garrod's conclusions, that in "Blood from patients suffering from Bright's Disease and albuminuria after scarlet fever: the kidneys are always deficient in their power of throwing off urea; but with regard to the uric acid, their excreting function may be impaired or not," adds:

"We thus see what serious disturbances may arise in the system by a perverted condition of secretion, arrest of excretion, and attempts at vicarious elimination of a product which must, in order to the preservation of health, be discharged from the body. The diseases thus produced come clearly under the head of *disordered vital chemistry.* Thus, when the above vital functions are weakened, or totally disabled, there must be not only general disturbance, but, after a time, some special manifestation of disease, and the results of vitiated secretion, decomposition, and over-worked and irritated organs." I believe that in remittent fevers, gastric or bilious, generally ushered in by constipation and arrest of glandular and secretory action, there is the same production and accumulation of effete material, which keeps up the fever and which must be removed by the usual eliminatory agents, accompanied with or followed by the use of some of the products of the Cinchona barks.

Teed, in his paper on "Fever and Inflammation," also Am. Jour. Med. Sciences, April, 1861, says that *fever*, from

its very commencement, seems to be a general disorder of the whole organic functions: "In inflammation the peculiar product is an excess of fibrin, in addition to the varied results arising from the affection of different organs; in fever the tendency is to a diminution of the fibrin and of the red corpuscles, the results of a general derangement of the secreting functions being added."

I procure from this author, also, at second hand, these definitions:

Copland writes "that the morbid impression (producing fever) is first made upon the organic or ganglionic nervous system, and owing to the circumstances of this system actuating the circulating, secreting and excreting viscera, is manifested in an especial manner by the changes observed in the state of vascular action, in the animal temperature, in the functions of secretion and excretion, in the circulating fluids, and in the other functions which are more or less intimately dependent upon the ganglial system."

Virchow says "that fever consists essentially in elevation of temperature, which must arise from increased consumption of tissue, and appears to have its immediate cause in alterations of the nervous system." He adds: "Every disease may become febrile; every disturbance may form itself into a fever if it extends itself to the centres which regulate the waste of the tissues, and the proper moderating power of the tissue metamorphosis is suspended."

Southwood Smith remarks: "that the order in which the morbid actions which constitute fever occur is, first, derangement in the nervous and sensorial functions—this is the invariable antecedent; secondly, derangement in the circulating function—this is the invariable sequent; and, thirdly, derangement in secreting and excreting functions—this is the last result in the succession of morbid changes. Derangement in the function of secretion and excretion never comes first in the series; derangement in the nervous and sensorial functions never comes last in the series; derangement in the function of circulation never comes

either first or last in the series, but always the second in succession."

Dr. Billing (Principles of Medicine) traces fevers "to a loss of the functions of the nervous centres, and, subsequently, of the organs depending on them." We may observe how many agree in the *nervous system* being implicated in the causation or progress of fever; and this consideration may enable us to account for the beneficial influence of certain agents, salts of potash, stimulants, opium and quinine among the number, which I had alluded to when the earlier portions of this paper were written, and which act specially on the nerves which govern and direct so many functions of the organism, and thus ultimately tend to cause the excretion of morbid accumulations. Dr. Billing says:

"The animal heat has been accounted for in different ways by several ingenious physiologists; from the aggregate of their opinions and experiments, I deduce that *heat* is *extricated all over the frame;* in the *capillaries*, by the *action* of the *nerves* during the *change* of the *blood* from *scarlet* arterial to *purple* venous; and *also* whilst it is changing *in the lungs* from *purple* to *scarlet.*

"There is a perpetual *deposition*, by the capillary system, of *new matter*, and decomposition of the *old*, all over the frame, influenced by the nerves; in other words, the galvanoid or electroid influence of the nerves, which occasions these depositions and decompositions, keeps up a slow combustion. In this decomposition there is a continual disengagement of carbon, which mixes with the blood returning to the heart at the time it changes from scarlet to purple; this *decomposition* being effected by the *agency* of the *nerves*, produces constant extrication of caloric; again, in the lungs that carbon is thrown off and united with oxygen, during which *caloric* is again *set free;* so that we have in the LUNGS a CHARCOAL FIRE constantly burning, and in the OTHER PARTS a FIRE of VEGETABLE or ANIMAL fuel, the one producing *carbonic acid gas*, the other *carbon;* the *food supplying*, through the circulation, the vegetable or animal

matter from which the *charcoal* is *prepared* that is *burned* in the *lungs*.

"It is thus that the animal heat is kept up; on the other hand, the EVAPORATION of PERSPIRATION keeps the SURFACE COOL; but in inflammatory fevers, where this is *deficient*, the body gets too *hot;* and in low fevers, when the nervous influence is not sufficient to keep up the full fire, the surface gets cooler than the natural standard. This is peculiarly evident in the beginning of eruptive fevers, as scarlatina, where there is strong heat, with the arterial color of the skin; but if the same becomes malignant and low, with deficient arterialization, the temperature sinks, and the diminution of the charcoal combustion in the lungs is evinced by the dusky color of the skin, shewing that the carbon is not thrown off as it ought to be: and the same phenomena takes place in typhoid cases, and still more so in malignant cholera.

"Whatever NERVOUS INFLUENCE may be, or however generated, we know that the *energy of parts* depends upon a something that is communicated to them by the *nerves* in conjunction with the ganglia, brain and spinal cord; that while parts are supplied with this nervous influence, they retain their power of action, and not longer; that arteries become less susceptible of impression from external agents when the nervous energy is low; that when the vital powers are sunk, the capillary arteries cease to secrete; that various *phenomena* in the *healing* of *inflammation* are the effects of *healthy action* of the heart and arteries. We find likewise, when *nervous energy* is *deficient*, that parts which had advanced to a certain stage of healing become flabby, as in stumps after operation when the patient sinks; and that when the power of the constitution, the nervous energy, fails, nitrate of silver will have no effect upon ulcers except chemical decomposition—not that astringent effect which is the result of contractility depending on vitality."

The following is the rationale, according to Dr. Jones, of Ga., of the phenomena which constitute a paroxysm of malarial fever as exhibited in its most common and regular

form, that of an intermittent: (See Rev. Am. Journ. Med. Sci., April, 1860.)

"The poison, as we have demonstrated in the chapter on the blood, first alters the constitution of the blood, and interferes with the actions and secretions of those organs which elaborate the blood, before producing any perceptible changes in the phenomena of either the sympathetic or cerebro-spinal systems; this alteration of the blood progresses, until a point is reached where either such compounds are generated in the cycle of chemical changes, induced by the malarial poison, or the constituents of the blood, especially the colored blood-corpuscles and fibrin, become so altered that disturbances are produced in the chemical changes by which the capillary circulation is maintained, and as a necessary consequence, the action of the heart, which depends, as all other muscular actions do, upon the chemical changes in the capillaries, is impeded, and the blood generally stagnates in the capillaries, and accumulates in the large bloodvessels of the trunk and internal organs, and the temperature of the extremities, due to the chemical changes of the blood in the capillaries and the surrounding tissues, sinks far below the normal standard; this arrest of the capillary circulation in the extremities, and probably also in the lungs, is attended by the retention of the products of excretion as carbonic acid, and the matters thrown off from the skin and kidneys; these excrementitious offending matters, together with the products resulting from the perverted chemical changes, due in part to the reduction of the temperature of the extremities many degrees below the normal standard, stimulate the sympathetic and cerebro-spinal nervous system; the sensation of cold is felt, attended by twitching and jumping of the muscles, entirely beyond the control of the will, because they are due to aberrated muscular and nervous action, arising from disturbances in the capillary circulation; and from the action of the perverted elements of the blood the respiration is aroused, more oxygen is introduced, and the temperature of the trunk elevated, provided

the alterations in the constitution of the blood have not proceeded too far, or the nervous system been so overwhelmed, either by the action of the altered products or of the malarial poison, that they cannot respond to the excitation produced by the altered and retained productions; the elevation of the temperature of the trunk is attended by more rapid circulation of the blood in the capillaries of the heart and of the nervous centres, and consequently by a more rapid and powerful action of the heart and generation of nervous force, the oxygen is introduced and distributed with greater rapidity, the chemical changes in the capillaries are again excited, the capillary circulation is first restored in the trunk, and then in the extremities, the elevation of temperature becomes general, and we have the phenomena called fever.'

"During the active chemical changes of fever, the malarial poison and the altered products of the blood are drawn into the round of chemical change, physically and chemically altered, and are finally thrown off from the lungs, skin, kidneys, and intestinal canal. After the removal of these offending products, the excitants of the sympathetic and cerebro-spinal system, after the system has been purified, as if by fire, then the nervous system returns back to the normal exercise of its functions; the force and frequency of the heart diminish; the panting, full respiration subsides into the calm regularity of health; the temperature, both in the trunk and in the extremities, returns to the normal standard, and we have what is called the remission of fever.

"'If remedies have been applied which effect the permanent alteration and destruction and removal of the malarial poison, there is no return of the chill, succeeded by fever. If, on the other hand, the poison has not thus been removed, the same round of phenomena is repeated; the blood is again altered, the capillary circulation is again retarded, and the whole round of phenomena are repeated.'

"The changes that take place in the color of the liver during malarial fever is referred, by Dr. J., to changes in

the amount and physical and chemical constitution of the blood in the capillaries of the organ, and to the physical and chemical changes in the bile, and the contents of the secretory apparatus.

"Alterations of the spleen are laid down by Dr. J. as among the very first of the pathological effects of the malarial poison, and previously to the development of the phenomena constituting the febrile paroxysm. The alterations consist chiefly in the engorgement of the spleen with blood, the softening of its texture, and rupture, in many places, of the trabeculæ."

It seems to the writer both plausible and natural, that when all the data are obtained by the clinician, the microscopist and chemist, to make up a complete history of each disease—when a knowledge of all the excreta peculiar to or characteristic of each one shall be acquired, then the processes going on in each will be better understood, and the rationale of their inception, progress and effects more thoroughly appreciated.*

For example: when we have fully ascertained, from the researches of the student of clinical medicine, that there are marked distinctive features in Scarlet Fever, viz: that there is true inflammation of the *skin* exhibited by its subsequent desquamation, and in some instance by its pealing off in large flakes, forming an entire cast of a limb; that this never occurs in either Yellow Fever or in fevers marked by periodicity, because the inflammation of the skin in these latter is not so intense; that in Scarlet Fever uric acid in the renal discharge and in the blood is more constant

* The writers and lecturers on the Practice of Physic should not adhere so rigidly to the stereotyped subdivisions into *prognosis*, *diagnosis*, etc., usual with them—their descriptions being often little more than a mere catalogue of symptoms, etc., as if each disease was a well-defined *unit*. They may not be species of extensive genera, linked together under orders and classes as by a natural system of classification, but they are often closely related one with the other. The difficulty constantly met with during epidemics of determining the true character of milder cases prevailing at the same time, or on their outskirts, show by what insensible gradations different types of disease shade into each other. Frequently no distinct lines of demarcation can be drawn, and at the conclusion of such visitation some prevalent forms of disease are left undecided.

and more abundant than in the diseases just mentioned; whilst under increased metamorphosis of tissue, *albumen* also more frequently escapes, because, perhaps, the functions of the kidneys are compelled to serve vicariously for those of the injured cutaneous surface, and congestion results; that this escape of albumen is much less common in other cutaneous diseases (or diseases of the blood with eruptions, such as Measles for example); less frequent also in Yellow Fever, and less still in Intermittent and Remittent. These facts, with others, being successively determined, will surely aid us in making comprehensive comparisons, and place us in a better position to argue with respect to such phenomena, to classify them, to make further deductions and establish general principles. In a word, we thus complete the natural history of diseases, and perform the legitimate functions of intelligent pathologists seeking to obtain enlarged views, befitting the scientific requirements of the age. I suppose I shall be accused by the *nil admirari* set of anticipating a general medical millennium. However this may be, let such always remember "*c'est le premier pas qui coute.*"

Again. Yellow Fever and those caused by marsh miasmata, on the other hand, will be found, after minute inspection, to have other features distinguishing them to an equally marked degree—other tissues and organs in those suffering from them being more prominently affected. Thus, to be very brief, we establish with respect to Yellow Fever: that it is a disease arising in hot seasons, in cities near to and not much above the level of the sea; that there is more rapid and fatal combustion of the blood than in intermittents; the fever—the vital heat and the burning sensation of the skin being more intense and uninterrupted—produces engorgement of the kidneys, accompanied by manifest impairment of its excretory functions, with the morbid results upon the blood, etc., following thereupon. Malarious paludal fevers are characterized by their more distinct and frequent apyrexiæ, or by remissions and by more perspiration; consequently, they are attended with

less heat and less combustion, with a greater tendency to congestion of the glandular system, engorgements, etc., particularly of the liver, spleen and mesenteric glands.*

So, also, the peculiarities of Typhoid Fever may be compared. It may be defined: a non-malarious or non-paludal blood disease, caused by animal poison, generally affecting depraved habits, in any clime or season, without material derangement of the skin or kidneys; producing or accompanied by disease of the intestinal glands, and causing gradual impairment of the blood; it is reproductive, possibly, by a species of ferment, and communicable; the poison which gives rise to, or is generated by it, seems to cling to and affect the nervous centres, and is only capable of being eliminated slowly from the system. Hence, though depuratory treatment is required, stimulants, with nourishment, must be used to supply and keep up nervous energy. The disease is essentially adynamic, and the poison renders the blood aplastic, with secondary inflammations or congestions of various organs. A knowledge of these characteristics will enable us to appreciate and compare the *tout ensemble* in each disease, in a more enlarged and comprehensive way. Thus, too, many apparently isolated facts concerning each, will be found subsequently, upon bringing them together, to result naturally from well-known conditions; and these facts, instead of remaining unattached, will soon come to be classified and to rank as unvarying features in their histories—as well known to every one as those more obvious ones that had been long since

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*From the researches of Prof. Joseph Jones, of Ga., in Trans. of Am. Med. Association, Vol. XII, on malarial fever, I ascertain, what is quite in accordance with my belief: that the "colored corpuscles of the blood, together with its albumen, is diminished, whilst the extractive matters of the serum are increased." "The destruction of the colored corpuscles being more uniformly observed and more rapidly accomplished in malarial fever than in any other acute affection. The destruction is affected mainly in the liver and spleen. * * * * The alteration and destruction of the colored blood corpuscles are invariably attended," Dr. Jones affirms, "by abberated muscular and nervous actions." He also says that animal starch accumulates in the liver, whilst there is at the same time an absence of grape sugar. See Rev. Am. Jour. Med. Sciences, April, 1860.

recognized and described. We shall then, likewise, be better able to anticipate the occurrence of certain morbid phenomena, to prevent the tendency to them, to ward them off, or to put in practice remedial measures for their relief should they be fully declared. The illustrations employed above might be indefinitely multiplied, and infinite comparisons established—each attended with real benefit to practical medicine. The truth is, very much such a process is that pursued by those who have made solid contribution to our stock of knowledge; and even he that establishes only a single fact, assists in enabling those coming after to make large inductions, and draw general conclusions. Many facts, as they are successively ascertained, will be found to aid, suggest or explain others previously acquired, and conspire with them to build up a regular system of medical doctrine; and this slow process but confirms the words of the great poet, in "Locksley Hall:"

"Science moves, but slowly, slowly creeping on from point to point."

I will now, merely for the purpose of illustration, give an outline of the process that may be adopted, by selecting from my own reading, and bringing into one view several isolated statements from different authors, which require the addition of others still to enable us to derive the fullest advantage from them.

Thus, the assertion is made by Thudichum, that *uric acid* is generated by the acid fermentation of mucus in the urinary passages. This, if correct, is certainly precise, and limits the area of its production—hence, we have next to inquire whether, in Scarlet Fever and Gout, in which its presence is marked, there exists this particularly acid mucus; and if so, why and how is it produced. Again, C. Robin states that it is found in the liquids vomited after retention of urine; whilst Nysten says that, obtained only through decomposition of the urates, it does not exist normally as uric acid, but presents itself accidentally, deposited in very small quantity in the crystalline form.

If this be so, then its great amount in Scarlet Fever and Gout will with more reason be regarded as morbid, and the special liability in the two diseases to decomposition of urates must be enquired into.

We remember that *urea* is one of the most important constituents of the urine, since it is the "vehicle by which the largest proportion of the nitrogen derived from the disintegration of the tissues is eliminated." (Hassall.) Funke corroborated the normal existence of urea in considerable proportion in the healthy cutaneous transpiration, also—a fact which had been denied by Schotting, who, it will be remembered, found it in so large quantity in the skin of Cholera patients. (See Med. Chirurg. Rev. Report on Physiol., from Moleschott's Berthage, 1858; also, reference in Braithwait's Retrosp., XXVII.) We reason, then, with more show of plausibility still, respecting the influence of diseases, or agents, whose principle force is expended on the skin in modifying the urea, or causing its injurious abundance in other portions of the body, than when we thought the kidneys only were concerned in its excretion. So, also, if Frerichs is correct, that the phenomena of uræmic intoxication, as in Ecclampsia, for example, (or Yellow Fever, I would add,) is not produced by urea, or by any, or all, of the excreted matters of the kidney, but by the transformation of urea accumulated in the blood into carbonate of ammonia; then the citric acid and the diuretics formed of vegetable acids, which the writer has found useful in Yellow Fever, and which are so commonly employed in many other fevers, have a scientific reason for their exhibition—as they neutralize the carbonate of ammonia. These considerations may be found closely related with the coagulation of the blood, with black vomit, hemorrhage, etc., where the blood is in a too liquid or aplastic state.

Sugar, Nysten says, is not found associated with the *phosphates*. In diabetes we must, therefore, seek to trace the relationship maintained between these substances.

We know, too, that it has been recently established that the chlorides are absent from the urine in certain diseases, as in pneumonia. Now, in diabetes, there is an excess of it—whilst an additional observation is made by Thudichum that uræmatine (another factor still) is in inverse ratio to the chlorides, and uræmatine (purpurine, urrosacine of some writers) is very much concerned in diseased conditions of the liver. (See Bird, and B. and F. Med. Chirurg. Rev., April, 1861.) When better knowledge is obtained concerning the seat and special manner of production of these principles, it will reflect light upon the diseases in which they are implicated, and *vice versa*. So, also, I might multiply examples of the action of certain remedial agents in the elimination from the system of special substances, and trace their adaptability to the cure or relief of special diseases in which the substances are shown to be in injurious excess. Whether this knowledge has been acquired empirically, as the mere result of experience, or experimental investigations are instituted to ascertain the applicability of certain agents to the management of special diseases, is indifferent to the argument. Investigations as to the precise condition of the blood, and the changes which it undergoes in disease, will be equally fruitful in their bearings upon practical medicine. See results of examination of Magendie, Andral, Becquerel, Jones and others.

It may have been from an instinctive yearning, natural to every man — his intellectual nature forcing him to seek after the occult reason of things, and rejoicing in the effort, however unsatisfactory. "*Felix qui potuit rerum cognoscere causas;*"—but, for years past, the writer has been occupying his thoughts in the endeavor to trace out and ascertain the cause, the history, as well as the rationale of the successful treatment of several diseases which offered favorable opportunities for comparison—whether occurring in hospital or private practice. He has endeavored to possess and to retain in his memory,

for the purpose of comprehending them better, all the peculiar distinguishing characteristics of Cholera, Scarlet Fever, Yellow, Malarial and Typhoid Fevers, Syphilis, Inflammation, Rheumatism, Gout—the winter diseases, viz: Pneumonia, Catarrh, Croup, etc.—wishing also to ascertain the reasons for their appearance and disappearance at special seasons; why some of them attack only certain persons, and under special conditions; and also to compare the effects of the most approved management generally adopted.

I trust, as I said before, that each and every one of these diseases will be investigated closely and philosophically in every point of view, with every instrumental means. I believe that the study will be fruitful in results, and that it offers the most satisfactory method yet presented for attaining great ends. But even where we cannot explain every step in the causation, growth and results of each; nor know with the utmost certainty why it is that one set of agents have gradually come to be employed for their relief, and why these are found to be more successful in the management of certain diseases than other agents selected at random; still, there is undoubtedly a material body of knowledge formularized and made available for use, which we have already acquired concerning diseases and remedies. This is daily increasing, and however wanting in breadth, accuracy and completeness, yet enables us to manage these diseases in most cases with pretty general success, where anything like a fair chance is afforded. This success is only the reward vouchsafed the physician, in return for his devotion to medical studies conducted after the most approved methods. It constitutes the best plea for the pursuit of medicine, as a distinct profession by an organized fraternity endowed with legal rights. In truth, it is the *only* profession, the practitioners and teachers of which, even in a democratic republic, should be under the *control of Government;* so as to have enforced, as among all

other civilized nations, certain provisions essential to the proper protection both of the physician and the public.

The maladies cited above, as well as others, have, it must be acknowledged, their appropriate remedies; the treatment of them is in a measure already formularized, and success or satisfactory results at least, in any fair case, is often only a matter of time. In proportion, too, as we attain to a more precise knowledge of the mode of action of the substances successfully used for their cure or relief, the more rational seems the fact that they do prove efficient agents—which is only an illustration of *a-posteriori* confirming *a-priori* reasoning. Syphilis, Rheumatism, Gout, etc., are best relieved by certain special agents, which seem, by general consent, most applicable to them, viz: local applications, mercury, iodide of potash, renal depurants, opium, quinine, etc. I speak generally when I say that in these, as well as in the majority of cases of fever, including eruptive diseases, Erysipelas, etc., the physician has, principally, to follow Chomel's golden rule and "do his patient no harm;" he must avoid mercurial, drastic and other too active purgatives, save in some cases at their inception, as in Yellow and other fevers, for example, which are ushered in with constipation and an arrest of glandular and secretory action; he must use cold applications to restrain inordinate heat, and for its tonic influence in contracting the distended capillaries; employ, frequently, warm, stimulating foot baths, revulsives, etc.; administer tonic and eliminatory agents, including quinine, diaphoretics, and renal and blood depurants. James' powder, the oxygen-bearing bodies, the chlorates, citrates, acetates, carbonates and nitrates of potash, or the carbonate of lithia, a substance recommended by Garrod as particularly efficient, may be selected; plain dietetic rules are also to be observed—not forgetting stimulants where the nervous centres are depressed, and agents capable of lowering the action of the heart where there is too much vascular excitement. Employ judiciously these and other

means obviously demanded by the exigencies of each case, which science, art or experience have taught us to be useful; *give the patient time*, and he will, in a great majority of cases, recover when seen under favorable circumstances. That is under the only conditions in which a logical mind would admit a deduction to be drawn, as to the value or applicability of treatment in a given case, and as a rule for the adoption or rejection of similar means under like circumstances.*

These apparently very simple means often secure the best results. A knowledge of them has been obtained partly in an empirical way partly by experiment; but in meeting and antagonizing those morbid changes constituting disease, which are operating in the human body, viz: nervous disturbance, inflammations, congestions, constipation, chemical combustion during the metamorphosis of tissues, accumulations of effete material—all which, un-

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* It has been the curse of the statistical tables and the *numerical system*, that the results deduced from them have been permitted to condemn this or that mode of treatment when, confessedly, no distinction is made as to whether the plan of treatment, or the special therapeutic agent tested, is used at an early or an advanced stage of a malady. The medical man gives his best aid to the sick whenever he is invited, at any stage of a disease; but, acting *en philosophe*, he is most interested in knowing what can avail in those which he sees from their inception, as this *can* be secured—knowing full well that in many diseases the benefits to be derived from treatment decrease in a geometrical ratio as the disease advances; and *vice versa*.

He would, therefore, be in error to condemn any particular method or any special agent, as entirely inefficient, which was capable, in the great majority of cases, of warding off or destroying a disease used at its inception, *because* it failed to have like powers when such morbid alterations had occurred to the organs as scarcely to afford any chances of recovery. Thus is explained half the discussion and difference of opinion concerning the results of the treatment of Pneumonia—which is still *sub lite*. Astringents, with opium, greatly relieve the usual premonitory stage of Asiatic Cholera, known as Cholerine, and when used in time, materially increase the chances of recovery. It would be illogical to say that all astringents, or all treatment, were utterly useless in Asiatic Cholera, because of fifty cases entering a hospital at the *tenth hour*, and who had the benefit of these agents, forty-nine died. Yet this loose system of recording, with its delusive air of precision, which vitiates all logical deduction, we are repeatedly called upon to bow down before as *conclusive*. Mere figures are thus dangerously deceptive. It shows how futile are bald statements, meant to *prove* that such and such a per cent. of a given disease died in a given hospital. No practical deduction can be made from them.

checked, lead on to fatal results—the means indicated above will be found to be sustained, it is highly satisfactory to believe, by what we know of the most profound chemical and physiological laws governing the reactions going on in the human frame. This or other plans, so elaborated after so many years of the world's experience, continue to succeed in the great majority of cases, *because* the partially hidden laws of the human economy, even in disease, respond uniformly under the action of the same or similar substances. This cannot be fortuitous, but must be under the dominion of *laws* which, under like conditions, uniformly maintains the relation of cause and effect, occurring repeatedly without material variation.

The method described is the very opposite of the "no treatment," or the pure and unmitigated *médicine expectante* system. Whilst *sufficiently* effective, it avoids being too actively injurious; it abstains from the *nimia cura medici* so properly reprobated, but, at the same time, equally shuns the opposite error. In studiously refraining from any course that would weaken the powers of the system, it yet gives the organisms time to perform their appropriate functions, or to recover those that were impaired or lost; by its several processes it arrests or moderates the excessive heat of fever, which vitiates and consumes the vital fluids; removes the morbid substances in the blood, generated by depraved functions or by chemical changes; by stimulants sustains the nervous centres, overwhelmed by morbid poisons, or by them arouses the too languid circulation; it relieves irritability; diverts from the congested organs, and leads to a gradual restoration of health as its natural result. Such methods are pursued because they have been found to be the most successful, and, as I said before, they are only subsequently sustained by what we can learn of the established laws of chemistry, physiology and pathology. But, at any rate:

"Sufficit scire quid efficiat, etiamsi modus nos lateat."

I would gladly take up each agent, however simple, whether it be ice, water, alkalies, acids, tonics, nauseants, neurotics, blood-letting, eliminatory agents, and endeavor to explain its active influence by the most rigid laws of chemistry and physiology, where they aid us—but space and time are wanting. A few striking examples, however, will be cited of the applicability of remedies to disease. I do this because there is a tendency, even by those high in authority (whether proceeding from indecision, or from the consideration of the fact that *mild* remedial and hygeinic measures *have* been shown to be the best in many cases) to go to vicious extremes and to decry all medical treatment. It is an *art*, we admit, but the tendency of medicine is toward its establishment upon a scientific basis. I dwell upon the subject more in detail, to express my entire dissent from the views of those who speak and act as if the profession they still continue to teach or practice was all a matter of the merest guess-work, without the faintest shadow of rule, method or principle about it.

To begin with a strong example: In the belief and experience of the writer, even Yellow Fever, if it cannot be aborted at its inception, or shorn of its terrors after it has made progress, will recover under any fair condition when seen at the commencement of the attack; this is accomplished by a mild but efficient mercurial purgative combined with quinine, cold applications, revulsives, blood depurants, opiates and quinine perseveringly and judiciously employed.* This treatment is not mere routine, but an achievement of art, and a result of the progress of human knowledge. Its apparent simplicity is no argument against it—the main object kept ever in view in its application, is to remedy evils already existing with the least injury to the invaded organism. With time, greater improvements will still be made; the treatment of other diseases, now the *opprobria* of medicine,

* See the method in detail in the Charleston Medical Journal.

will be still more clearly established, and they will be more rapidly, certainly and easily managed by measures put into practice at their very inception—thus accomplishing for them what, esteemed impossible, has been already done for other diseases. His own experience, as well as that obtained from books, has taught the writer the truism, not always acknowledged, however, that there is a good and a bad way of doing everything, with intermediate grades also. It is surely *possible* that one may not be possessed of what his neighbor has, and be glad to adopt what is taught him only after long delay by the indisputable success of others. The writer, like every man of ordinary common sense, is compelled at every step to be appalled at his own feebleness and ignorance, yet he speaks without presumption in expressing the belief that it accords with the experience of almost every professional man, to be forced to admit having acquired new and more successful modes of managing diseases which at one time proved intractable. This will be acknowledged by all save the hopelessly indolent, those blind to progress, infatuated in holding on to beaten tracks, and realizing, in their own persons, the forcible and truthful expression: that "there is nothing like the respect which ignorance has for ignorance." These qualities are often coupled with the possession of an obstinacy which is *not*, as boasted, the result of *rational* incredulity, but that fancied pre-eminence and superiority which the assumption of a general air of disbelief carries with it, is often sufficient motive with them for its parade—whilst the opinion may be ventured that such, having no fixed principles of belief or of action, flee for refuge in every exigency to the "*mild* chloride of mercury." This *we* call *calomel!* but it came from out the furnaces of our masters, the alchemists, in contrast to the more terrible energies of the corrosive sublimate ("Draco ferox"), personified as the "*Mild* Dragon," the "White Eagle." In the most scornful words of the "Divine Poet:"

"Non ragioniam di lor, ma guarda e passa."

Scarlet Fever, also, is far less actively and far more successfully treated than formerly. There was a time when measles, under active treatment, was a more fatal disease than now: when it is established that, with care, a rigid confinement to mild demulcents, it almost certainly terminates favorably; when Intermittent, Remittent and Congestive Fevers, the multiplication of their paroxysms remaining unarrested by quinine, destroyed entire villages, or, by their ravages, left rivers unnavigated; when supportive treatment was not ascertained to be the basis of the management of Typhus and Typoid Fevers. Notwithstanding all the controversy, Pneumonia makes fewer victims, both among whites and negros; and the prevention of Small Pox, the arrest of secondary and tertiary Syphilis, and the rapid disappearance of diseases of the skin, under appropriate means, furnish such striking examples of progress as to be most encouraging. *Per contra:* Blood-letting was, in times past, greatly abused, and so were emetics; salivation was *once* the rule. I hazard little in saying that thousands of the survivors of the generation now passing away, are suffering from the indiscriminate and wholesale use of mercury, which was sapping literally the life-blood of the nations; and that those now coming upon the stage, are happy in being partially delivered from it. This proceeds from a more just conception of its mode of action and its effects.

Again. There is no doubt that the zymotic disease, Diptheria, which has extended from California to the Atlantic coast, *is* curable, *when seen early*, by nitrate of silver applied locally, and by muriated tincture of iron, brandy and quinine, with nourishment given internally; equally certain that delay, or an opposite course, viz: emetics, nauseants, depletive or weakening treatment, will prove rapidly fatal. In the hands of one physician nearly every case of Typhoid Fever terminates fatally, whilst another, with no better opportunities, but under a radically different system, manages the disease judi-

ciously and successfully. It is susceptible of proof that super-tartrate of potash and iron will put an end to erysipelas, dependent upon an impaired condition of the blood and capillaries, as well as to those eruptions so closely related to erysipelas, which break out over the face and body, and are accompanied by large, albuminous exudations; also, that quinine, with morphia, is essential to the rapid recovery from Brow Ague and Neuralgia; that muriated tincture of iron will rapidly and certainly, and without the assistance of instruments, relieve impervious urethra, caused by an abnormal condition of the mucus membrane, whether owing to morbid sensibility, to relaxation, or spasm of the capillaries. The strong compound tincture of iodine, or ointments of this substance, with mercury, applied locally, at the inception of disease, act powerfully as discutients; arrest rapidly and certainly glandular diseases, carbuncles, whitlows, boils, inflamed glands, etc., which, unchecked, would be followed by suppuration, by wasting discharges, accompanied with the usual constitutional disturbance and prostration of the general health.

Alkalies, soda, lime water, an occasional mercurial, revulsives, with attention to diet, must precede the use of quinine in the cure of Gastric Remittent Fevers in children, which they accomplish most satisfactorily. So mercury and opium in Iritis and Peritonitis, opium and anti-spasmodics in Hysteria, iron in Anæmia, ergot in Parturition, ether, chloroform and cold water in surgical maladies and for the relief of pain, furnish examples. The application of many of these, unattempted, undreamt of twenty years since, give triumphs over disease and suffering which even the imagination of man had rejected as impossible, and which are the fruit of modern progress. They repel, by the most conclusive proofs of utility, the attempts of those who would speak slightingly or with disdain of the resources of the instructed physician.

I am not wanting in appreciation of the great minds

of the past, or of what they accomplished in their day and generation; but I do *not* believe that Galen, Boerhaave, Sydenham or Broussais cured fevers as rapidly, safely, or as pleasantly as we do. Neither had they attained to like success in the treatment of many other diseases which now yield, under the administration of the mildest agents, in the feeblest hands armed with knowledge which was denied to the most gifted of our predecessors.

We may, it is true, with only a moderate approximation to accuracy, explain *why* it is that laxatives, mercury, tonics, iron, quinine, opium, anæsthetics, astringents, stimulants, nourishment, have a peculiar action beneficial in the several diseases before mentioned, or in others. After experiment, and furnished with the results of accumulating experience, we may only speculate upon the influence of these agents (primarily, perhaps, or after absorption), upon the nerves and nervous centres, upon the circulatory system and the capillaries—giving tone and producing normal contraction, with depuratory discharges, attended with the promotion of the general health and strength of the whole system. But the most important point of all is most clear: that they do act beneficially, and it is far better to use them than to resort to no treatment at all. This will be granted with respect to their applicability to the cure or relief of many diseases; if it is not, then the physician, so far as they are concerned, if he has no better substitutes to offer, is, by a legitimate conclusion *functus officio;* and if the same is to be affirmed of all the remedial measures so far at our disposal, viz: that they are useless or injurious, as many would seem to imply, if we judge by by their words, then the public *teaching* of medicine as an *art* should be abandoned. But, unfortunately, those who deny any rational or efficient system of medicine, in *practice* often use the most powerful medicines unscrupulously and heroically.

Dr. Billings' work may be consulted, with Williams',

Headland's, Todd's, Bennett's, Mialhe's and those of others, on the several points which they have specially examined and discussed, and which have been referred to above.

Certain features of MALARIAL FEVERS, as they prevail with us, require to be re-sketched more clearly, in order that their distinctive peculiarities may be more accurately defined and kept in view. I must, therefore, take occasion here to make one or two practical remarks on the subject of *Gastric* (*or Gastro-enteric*) *Remittent Fevers*, whether occurring in children or adults, which are suggested by my own observations, made repeatedly both with respect to their treatment and the relation they bear to fevers more strictly of malarious origin. I do not know any writer who has urged either point fully enough, and yet the omission to keep them clearly in view is easily attended with disastrous consequences.

I must first admit that, possibly, more or less marsh malaria, giving a periodical, or rather a remitting, character to fevers occurring both during winter and summer, is found to impress those met with both in Charleston and in the surrounding country; and that the existence of a malarious element may in part account for the *remittent* character of fevers apparently purely of gastric origin—certainly caused by some derangement of the digestive and nutritive functions—existing in *cities* which are almost, if not entirely, exempt from *intermittent* fevers.

Now, gastric remittent fevers, so called, are a common form of disease, particularly among children in the City of Charleston. They are *characterized* by a slight tenderness upon pressure over the abdomen, and by a tongue *pointed* and *red at the margins*—not furred, save a little in the centre. The tongue is never white and flabby, or what is called foul, as in bilious, in *intermittent*, or in worm fevers; nor has it a yellow fur as in disorders where the

liver is particularly involved. The sub-acute inflammation or irritation existing in the gastro-intestinal tract, the result of the impaired or over-tasked digestive organs, is a main diagnostic feature, I consider, in the disease; whether the remissions which also characterize the fever are, or are not, dependent upon a coexisting malarious or paludal influence—supposed never to be absent from our entire seaboard as well as our river courses. I only refer here to the possibility of a malarial complication, giving rise to the remissions in Gastric Remittent Fever met with in the city; but think it more important to lay stress on this point: that when we find a pointed tongue, red at the margins, occurring in any fever, whether within the limits of the city or in the rural, or what are more generally considered the malarious districts, it must be taken into consideration as indicating a *material element* in the disease, viz: a sub-acute irritation or inflammation, to be removed by appropriate means.

In the next place, and what follows naturally, is, that these fevers can be certainly brought to a successful termination; never by quinine alone as in pure intermittents, but by mild mercurial alteratives occasionally used, with Dovers' powder at night; soda and nitre mixtures, lime water or other similar agents given repeatedly; also, by revulsives of mustard applied to the abdomen and by foot-baths assiduously used, so as to aid in removing the gastric derangement, with cold sponging to the arms and head freely and continuously employed when the fever rises. Then, and not before, quinine will be found serviceable. Such a course of treatment, it may be safely asserted, never fails. Having thus treated the disease very frequently in this city, I have never seen a case terminate fatally.

The frequent and prolonged use of calomel and opium for days, which are or were supposed by some essential to the relief of gastro-intestinal inflammation, as well as in the management of the so-called Bilious or Country Fever, or an exclusive reliance upon quinine, are un-

called for, if not decidedly injurious, in cases of Gastric Remittent Fever.

Gastric remittent fevers, be it observed, *are not confined* to cities; but they may occur just as frequently, though probably under a graver type by reason of the greater amount of malaria, in the country, in situations where fevers of paludal origin are rife, and where *malaria* is generally, but often erroneously, thought to be the sole cause of all the fevers which manifest themselves—thus often leading to great errors or important omissions in treatment. When this element, viz: gastro-intestinal irritation, *marked* by a red, irritated, pointed tongue, gives rise to fever in those residing in malarial regions remote from the city, or when it accompanies attacks of bilious remittent fevers caused by climate, the same treatment indicated above must be pursued. For we have in both cases an irritated, inflamed or congested condition of the gastro-enteric mucus membranes *plus* the malarial poison. We are not, without reason, to insist that here quinine, calomel and opium must necessarily constitute the basis of all treatment. We must in both situations equally have recourse: first, to preparatory treatment, including revulsives, etc., before resorting to antiperiodics, if we desire not to prolong the irritation which keeps up the fever, and which is often an essential cause of it.

Agues, pure *intermittents* and fevers of verminous origin, are very different things. In these a single mercurial laxative, a full dose of opium, quinine or an appropriate vermifuge, are amply sufficient—because it is of unmixed malarial origin in the one case, and the existence of a parasite in the other—hence the specific or the vermifuge is omnipotent. These distinctions should be kept ever in mind, in order to avoid useless or injurious medication, or the omission of that which is essential.

In gastric remittents or in bilious remittents, existing in town or country, accompanied with irritation of the gastro-intestinal mucus membrane, there may, as I admit, be a malarial element; but the latter is always superim-

posed upon a dyspeptic, irritative or inflamed state of the mucus membranes with depraved nutrition; there is also generally, if not always, acidity coexisting. Hence the alkaline agents, soda and lime water, with the renal depurants and diaphoretics, nitre and occasional mercurial alteratives, as stated above, must be combined with revulsives, with ice and cold applications, before quinine can be supported or employed with advantage.

In bilious intermittents or in remittent fevers of great violence, dependent upon great intensity of malarial poison, where there is evident torpor or congestion, or chronic disease of the liver, calomel and quinine in full doses, with other appropriate means, may be used before the paroxysm often with great advantage. Mercury, calomel and opium, or drastic cathartics, need not be given every four or five hours for days—as was once, may be is now, the practice with some—for their supposed curative powers, *in any fever*, save those caused by inflammation of the fibrous tissues, pleuritis, peritonitis, iritis, etc. Thus given *they irritate and keep up* the gastro-enteric inflammation or irritation, and with it the fever and general excitement of the system.

The writer had abundant opportunity, during four years service as Physician and Surgeon to the Marine Hospital in this city, to treat a large number of cases of remittent and intermittent fevers, often of high grade of intensity. These occurred among persons who had been exposed, or who slept at night, upon the banks of the Savannah, the Pee Dee or the Santee river, or they came from the coast of Africa or the Isthmus. Mercury was used not ten times in over a hundred cases which terminated favorably. It was avoided with a special view to test the question whether or not it was essential in the management of bilious remittent fevers. I cannot give the figures accurately now without recurring to my books; but the reader may consult the article on "Sulphate of Cinchonia," in the Charleston Medical Journal, where, of a report of fifty cases treated in succession with this

agent, not one died. Mercury was often never used, save an occasional dose to aid in stimulating the excretion of bile, or where the tongue was inclined to assume the aspect it has in Typhoid Fever—indicating an arrest of glandular and secretory action. I would not object to a full dose of calomel, with soda and ipecacuanha, at the inception of these cases; and where there is dryness of the tongue and a tendency to coma and delirium, stimulants and revulsives are specially indicated.

The most usual formula, as stated in the article, was the following, used at the inception of the treatment, and continued for several days:

℞ Sulph. of Cinchonia, grs. x.
Arom. Sulph. Acid, gtt. x.
Sulph. of Morphia, grs. $\frac{1}{8}$, given three times a day in water. Sometimes when the patient entered early, the treatment was begun with the following combination:

℞ Calomel, grs. vi.
Ippecac., grs. $\frac{1}{3}$.
Sup. Carb. Soda, grs. iii.

Dovers' powder and sweet spirits of nitre were given occasionally at bedtime—sinapisms and foot-baths, with cold applications to the head were employed when necessary, and a very large use of stimulants with revulsives to the neck and spine, with an occasional mercurial whenever there was, as stated, a tendency to dryness of the tongue or stupor, showing depression of the nervous centres, as occurs in remittent fevers assuming a typhoid character. Purgatives were not employed. This method was abundantly successful. There was never any attempt made to deplete, to purge, to salivate, or to do anything more, with the exceptions mentioned above, than simply to give quinine or cinchonia, to eliminate the materies morbi through the various channels, and to sustain the patient. Alcoholic stimulants, as I said, were very well borne when required in those cases where the nervous centres and the cerebral organs seemed overwhelmed by the great intensity of the malarial poison. Diuretics,

chlorate of potash, etc., were also occasionally employed at intervals between the administration of the quinine or cinchonia mixtures. Here, too, when the redness of the tongue indicated gastric or gastro-enteric complications, sinapism, alkalies and an occasional alterative were more studiously employed, precisely upon the principle that they would be used in the same condition so much oftener met with among children. But, as I said before, very many cases, both of intermittents and remittents, got well without a single dose of mercury.*

I must be indulged whilst inserting here the following, extracted from Stillé's Therapeutics, Vol. II. I endorse in full the doctrines it conveys, and believe their adoption in practice would be a great boon conferred by the practitioners of medicine upon the people. It was only confirmed by my own previously acquired experience in the hospital:

"The cholagogue action of mercury is invoked in this affection to relieve the overloaded liver, as it is in Yellow Fever to stimulate the non-secreting liver. Leaving unattempted here the task of reconciling these apparent contradictions, let us endeavor to learn whether or not experience has proved mercurials to be useful in Bilious Remittent Fever. In reference to their *purgative* action, it may be remarked that this is generally sought for at the beginning of an attack, by the administration of ten grains of calomel at bedtime, and some saline laxative,

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* I insert in a note an abstract subsequently obtained from my printed reports of cases treated at the Marine Hospital, made during three years, to the City Council and to the Faculty of the Medical College of South Carolina. I give the totals—several cases of those terminating fatally entered the hospital in a moribund condition, and yet there were but 8 fatal cases of 216, including 13 of break-bone; 91 cases in succession were treated without a single fatal one:

	Cases.	Deaths.
Intermittents	114	0
Remittents	79	5
Typhoid and remittent assuming a typhoid form	10	3
Break-bone	13	0
	216	8

or else jalap, on the following morning. But even at this stage such treatment is unnecessary, unless the abdomen is full and hard, the tongue much coated, and the alvine evacuations sensibly disordered. In this disease the real remedy is quinia, and it is much better to obtain its specific operation as soon as possible, feeling assured that then the associated local derangements will be all the more readily removed.

"It may be presumed that the employment of calomel as a constitutional remedy in this disease, whether by the daily repetition of slightly laxative doses, or the more frequent administration of still smaller quantities, is still the general practice in some portions of the United States.* So far as those forms of the disease are concerned which originate in the Middle States of the Union, we have never found it necessary to prescribe mercurials except as purgatives, relying, for the cure of the disease, upon quinia alone. It is possible that the more inflammatory form of Remittent Fever met with in southern latitudes may call for a different management. But the excellent reports of Dr. Boling, and several other southern physicians, render this supposition improbable. Moreover, if we turn to the East Indies, whence the calomel treatment first emanated, we shall find that it no longer holds its original place in the medical creed of that country. One of the most eminent of the East Indian practitioners, Dr. Charles Morehead, says:† 'The practice, at one time too common, of exhibiting calomel in doses of four or five grains three or four times in the course of the day, without any very definite object in view, and continuing it for a succession of days, cannot be too strongly discouraged. Not only is it unnecessary, but, for the following reasons, often positively injurious. In watching the progress of cases thus treated, it is not difficult to detect a train of symptoms much more fairly

"* Compare Boling, on Remittent Fever, Am. Jour. of Med. Sci., July, 1846, p. 29; and Dickson, Elements of Medicine, p. 243."

"† Clinical Researches on Disease in India, I 202, 206."

attributable to the treatment than to the disease, because it is in cases thus treated that this has been chiefly observed. The symptoms to which I allude are uneasy feeling, sometimes amounting to pain, with a sense of oppression or sinking at the epigastrium, and occasionally griping of the abdomen, for which leeches are not unfrequently applied, and purgatives unnecessarily given. The frequent repetition of the calomel keeps up also a foul state of the tongue, nausea and irritability of stomach, aggravates the febrile excitement, and produces an irritable state of the bowels, marked by frequent watery discharges. The convalescence of cases thus treated is always tedious, and frequently complicated with diarrhœa and clay-colored dejections.' . . . 'I am of opinion that an endeavor to induce mercurial influence in Remittent Fever is erroneous in theory and of no value in practice;' not only so, but 'it is opposed to all rational theory, and very injurious in practice. If it be true that prostration of vital actions and a deteriorated condition of the blood are pathological states to be much dreaded in Remittent Fever, and if mercury deteriorates the blood and favors prostration, on what principle of reasoning can it be supposed that induced mercurial influence can have any other than an injurious effect on Remittent Fever?' The author further attributes to the mercurial treatment so long prevalent in that country, the frequent occurrence of a cachexia marked by asthenia, dyspepsia, injured teeth, pains in the sides and loins, foul tongue, constipation, pale fæces, and depressed spirits."

After much reflection upon the causation of fevers, I have come to conclusions, as follows: There are several exciting causes, generally atmospheric in their nature, but differing in character—any one or several of which (as we do not know whether it is a unit) are capable of giving rise, respectively, to the several forms of fever, recognized as distinct. The intensity of the resulting fever is in some ratio with the intensity of the cause, though modified by the varying condition, corporeal, con-

stitutional, etc., of the recipient. The duration and intractableness of the fever also depend upon certain special conditions: the intensity or concentration of the external cause being one—the special state of the individual subjected to it being another. The individual who has been exposed to the cause in its most concentrated form, or whose system has been impaired by any previous depressing influences or agencies, is most likely to yield to these diseases.

I will refer here briefly to one or more forms of fever, not miasmatic; but am only inclined now to lay stress upon the latter, as a special subdivision of this Essay is devoted to the morbid appearances observed in intermittent and remittent fevers. For the first illustration, I will select one form of disease where the exciting cause is anything but atmospheric; but where, in the subsequent history of the results, *fever* is met with and the tendency to its assuming a virulent form is much aggravated by the condition of the surrounding atmosphere—as in hospital gangrene and traumatic fever occurring in ill-ventilated hospitals. A wound is received: capillary stagnation, impeded circulation, disturbed nutrition, increased fibrin, etc., occur, and inflammation and *fever* follow. This is accompanied by accumulation in the system of effete matters, sometimes purulent, increasing the difficulty, leading on to general constitutional disturbance, etc., and requiring to be removed or modified by special therapeutic and hygeinic means.

Again, a person is exposed to the morbid effluvia or bad air existing in greater or less proportion in a single house, a city, or a section of country, and he falls a victim to that peculiar resultant ever accompanying or following sufficient exposure to one form of materies morbi, viz: Typhoid Fever. So, with Typhus Fever, the cause, symptoms, course and general history of which are somewhat different from Typhoid. Every individual exposed does not take these diseases, but only those whose systems, from the various accidences of life, are more prone to their

reception, or who yield more readily to the influences which produce them. So with Yellow Fever: a certain condition of atmosphere is generated in, or the materies morbi is brought into a crowded, foul, or badly ventilated city near the sea, during the heats of summer, and certain persons fall a prey to it more readily than others—from previous conditions peculiar to them, which render their persons more liable to the inception, incubation and spread of the peculiar poison, causing Yellow Fever. The stranger or the native child, during the hot seasons in Charleston, yields to the poison of Yellow Fever; in Paris, one is more likely to be affected by that of Typhoid; in Dublin, to the poison producing Typhus Fever.

So, also, malaria—paludal or marsh—exists in particular sections of our country; all breathing the air, or occasionally exposed to its influence, do not take the peculiar *fever* it is capable of producing, but only a limited number. Some of these may be previously enjoying a high degree of health, but have inhaled or absorbed a very large dose of the poison; or, what is more probable, they have been previously subjected to one of the most common exciting causes, viz: a great amount of *fatigue*, or to the chilling and sedative influence of cold or damp night air, to rain, to the effects of great solar heat. Perhaps they have suffered from gastric or gastro-enteric disease, depraved digestion from prolonged excesses in eating or drinking, all which, when repeated or long continued, tend to depress the powers of life, to impair the activity of the secretory functions, and to render one person more prone than another to yield to the noxious influence of the surrounding malaria. Others, living in the same section, exposed under precisely similar external conditions, may inhale or absorb the same amount of malaria, and have it eliminated from their systems; they do not yield to it, because their digestive organs and their entire glandular and vital apparatus perform their functions more perfectly, so that if the poison is received

into their systems, they are enabled to eliminate or to throw it out.

I have repeatedly followed up from their inception, or have had detailed to me by others, the history of attacks of intermittent and of bilious remittent fevers occurring among gentlemen living in the country where malaria, in varying amount, is probably always present. It was not necessary for these, usually residing during the summer months on comparatively dry, pine-land ridges, wholly or only partially exempt from malaria, to sleep on a plantation or to be drenched by a hard rain, to suffer from an attack of fever; but the mere subjection to any depressing cause, any unusual exposure to the heat of the sun, to more than ordinary fatigue, changing the air by visiting the city or neighboring islands, and whilst there taking fatiguing walks, or, as in several cases under my own eye recently, a long drill, sufficed to develop a fever *characterized by periodicity*. Generally these attacks were of short duration and easily, if properly, managed—sometimes they prove dangerous, from the supposed stimulating influence of sea air; but this is more apt to occur, I am rather inclined to believe, when those are seized who are also suffering from gastro-enteric complications, and in whom purgatives are too freely employed. These cases show conclusively that the attacks were not always owing exclusively to any greater prevalence at the time of malaria, but that the fever was developed or excited by causes inherent in, or dependent upon the special external or internal condition of the *individual*—there being always enough malaria to impart a paroxysmal character to the fever, the malaria *alone* being insufficient to *give rise* to it. There has always, previously, been some exposure to *malaria*—for fatigue alone, or exposure of any kind, would never give rise to such fevers in any region absolutely exempt from paludal influences. In special situations, and at certain seasons also, malaria is more abundant. The fever following the exposure or fatigue, is often a clearly marked *intermittent*; and it should be added,

that those living in the city who suffer from an attack of Intermittent Fever, have almost always, if not invariably, been residing in or visiting the country, though well-marked intermittents have seemingly been produced within the limits of the city. I have seen more than six cases of severe Bilious Remittent or malarial Fever in one house in Charleston, which was in close proximity with very marshy ground.

These statements are also reconcilable with another result of my observations, accumulated during several years acquaintance with life in city and country, that: malaria may exist in some localities, as for example on our river swamps in the neighborhood of the Savannah, Pee Dee, and Santee rivers and elsewhere, in so concentrated a form that those exposed often succumb without the additional aid of fatigue, but solely from the dose of it breathed during the normal condition of existence. The intensity of the malarial poison fluctuates everywhere, and this will have a great deal to do with the gravity of the fever elicited by any cause. Even the pine-land residences, also, resorted to for their supposed greater immunity from malaria, vary greatly in this respect—dependent somewhat upon the character of the season, but for the most part, I believe, upon their greater or less protection by sufficient barriers, whether of wood or by their distance from the *cultivated lands* and the swamps. The former are more noxious than the latter, in my opinion, because more exposed to the influence of the sun.

Let us now consider another distinct form of fever, already referred to:

A child living in the City of Charleston, if breathing marsh malaria at all, *very* rarely receives it in so concentrated a state as to suffer by this cause alone from Intermittent or from Congestive Fever, or even what may be styled an attack of Bilious Remittent Fever. But should the same child be subjected to a repeated and long-continued course of improper nourishment, including cakes, candies, etc.,

to which they are so often injuriously treated, after a time nutrition becomes impaired or arrested; the necessary chyle being imperfectly elaborated from the irritated and depraved condition of the mucus and glandular structures, effete matters accumulate in the system each day more and more; the wheels of life are finally clogged, the play of affinities between the organs are disturbed or arrested—and *fever* is declared. Everything has been slowly conspiring to this end, but it requires sometimes the addition of a cold, perhaps, or other disturbing cause, to develop the fever, which is not an intermittent, but a *gastric* (*or gastro-enteric*) *remittent.* It is always a *remittent*, generally lessening during the day to be increased at night, until it slowly disappears after one or more weeks duration. Sometimes the fever is very high, but it varies in intensity in proportion to the sum of the causes which produced it and the strength of the constitution; by which term I mean: the general endowment which the organs of the individual possess for performing their normal healthy functions—and consequently for regaining those functions when impaired by excesses. Even when a cold, or other accidental additional cause, does not hasten the development of the fever, it is produced, as the French call it, *d'emblée*, seemingly by an effort of nature to rectify the abnormal condition, gradually induced by the depraved state of the nutritive organs, which has reached, as it were, its climax. But this fever is seemingly much more than a mere temporary *embaras gastrique*, if it is not a direct result of gastro-enteric irritation or inflammation. At any rate, the *fever* indicates the general disturbance, the commotion of nature, as it were, accompanying the efforts of the system to throw out the morbid products generated—the effort to rectify, in other words, the abnormal condition induced by the depraved state of the digestive organs. The remedial measures before indicated, viz: revulsives, cold applications, mercury and chalk, alkalies, nitre, eliminatory agents, *followed by quinine*, all tend, logically, I may say, to aid in restoring the imprudent—oftentimes innocent—sufferer to his or her pristine condition.

Sometimes, as I said before, when one, whether child or adult, with these gastro-enteric complications, removes to, or lives in a more malarial region, he there suffers from the usual result of pure malaria, which, when it affects any system with healthy organs, produces intermittent fever or chill and fever; but the attack must, necessarily, under the conditions just specified, be super-imposed upon the gastro-enteric derangement. The resulting fever, when this complication exists, in my opinion, will invariably be a remitting fever; and the treatment, to be safe and quick, must be directed to both conditions or elements in the disease which results. I say that a fever with a gastric or a gastro-enteric complication is a remittent, because I believe that the *constant presence* of the gastro-intestinal irritation or inflammation maintains and keeps up the *continued* circulatory excitement—the malaria being responsible only for the periodicity. Often, were it not for the gastric irritation, or the weak organ, or the fatigue, the individual would escape, even though exposed to the malaria—and thus many do escape; any or each of these health-impairing agencies is like the additional feather upon the camel's back, which suffices to bring it down.

I have spoken of *Bilious* Remittent Fever—using it as a distinct term—because I believe that remittent fevers occurring in malarial regions are often accompanied by special disturbance of the biliary organs—much oftener than either intermittents, or the gastric remittents, of cities. We never hear of a *bilious intermittent!* But intermittents, agues, chill and fever, lead to chronic enlargement of the liver, spleen and mesenteric glands, followed by anœmia, leucocythœmia and other blood degenerations which are natural results of the congestions occurring in these blood-making organs during the cold stage.

Congestive fevers, bilious or other, are gastric remittents complicated by the effects of malaria in virulent amount, occurring in persons whose nervous functions are greatly disordered, and whose systems, from various depressing causes peculiar to them, cannot react during the apyrexia.

It is highly probable, indeed, that the peculiar phenomena of the fever (intermittent or agues) caused solely by so subtle an agent as malaria are produced entirely by its influence upon the nervous system, and that the chill more especially is a nervous phenomenon. My reasons for this opinion are strengthened by several considerations: 1. The chill and fever may occur in one exposed to malaria without being accompanied by the slightest particle of inflammation—he being perfectly well both before the attack and during intervals after the earlier chills. 2. *Par voie d'exclusion:* the congestions produced during the cold stage or chill can only be accounted for through nervous agency, reflex or other—as all acknowledge to be the case in the equally sudden and remarkable phenomena of hysteria, an eminently nervous disease, in which there are cold sensations experienced, often with arrest of secretory action and violent congestions. Asthma, perhaps, might also be cited, as sudden spasmodic attacks appear to depend upon nervous stimulation or irritation set in motion by the influence of cold, etc. 3. The most efficient remedies—opium, quinine, arsenic—all producing a special effect upon the nerves, put an end to, or prevent the chill. Quinine acts almost certainly as a prophylactic also, by its *continued* influence, I think, upon the nervous media, as before described. That it does act on the *nerves* is obvious. The ringing in the ear, the relief afforded by its use in neuralgia, etc., may be mentioned. 4. An approaching attack of ague may be prevented or deferred by deceiving the mind, or by acting in some way upon the emotions. A powerful shock of any kind certainly arrests the chain of morbid phenomena, seemingly by its influence upon the mind through the nerves—substituting some sympathy or mental state stronger and more potent than that caused by the malaria—the dominion which it exercised over the system being, for the time, overcome. It is highly *probable* that this is an antagonism between *nervous agencies.* It will be remembered that every organ of the body, including the whole glandular system, is controlled by the nerves.

Lastly, a sensitive, delicate child, with fine nervous organization, has no digestive derangement whatever, is not exposed to marsh miasmata, and, therefore, does not suffer from Gastric Remittent or Intermittent Fever; but, after fatigue, coupled with exposure to the sun, it is seized with a hot, burning *fever* of a single day or a few hours duration, and known as *Ephemeral Fever*. Here, calomel or quinine are not required, but if anything at all, a mild laxative, a diaphoretic and rest.

Scarlet fever, measles, small pox, are each *sui generis*, are disseminated by exposure to special morbid poisons, working in the blood after the nature of a ferment, and which are peculiar in their nature. But this is not a treatise on fevers, and I only desired to refer to some special distinctions which I regard as of *practical importance*.

I will now state some of the results of my own Examinations, so far as special details are concerned, with a few general conclusions arrived at from a review of the whole paper. I have had to suggest a portion of the nomenclature used—so that of the thirty-six substances, elements, etc., designated as having been sought for in the excreta, in fluids, tumors, concretions, etc., whether successfully or unsuccessfully, I am responsible for the isolation of a few, to which my attention was attracted either by their frequency or peculiar appearance. These were so characteristic as to warrant my arranging them together in the tables presented, and, without yet assigning them names, to content myself simply with an exact *description*. To demonstrate the advantage of thus noting everything remarkable, I have since, by consulting the drawings, etc., of others, been able to recognize substances not at first known to have been before described. Thus, the bodies observed by Beale in Rheumatism, "cells of acute Rheumatism," I have since recognized; I had

segregated them for future attention long since. The same is true, also, of *corpora amylacia*, of nitrate of cystine (which I have reason to believe are quite abundant), circular bodies formed of concentric layers or rings, etc.

I think that I have found cystine in original cystals three times. (See cases described and references to it, under that head, in the Statistical Table, No. 1.)

It should be remembered that the appellation "organic globule," sometimes "inflammation granule," (but the terms are not synonymous, in my opinion,) refers to the bodies described by G. Bird, and by Beale and others; but that they were not, in every case where I mention their presence, subjected to the action of acetic acid. In appearance, however, they corresponded alone with the description given of these bodies by Bird, and with nothing else—neither with blood, pus, mucus or oil globules. The "organic globule" of Bird differs, I think, from the "inflammation granule" represented by J. H. Bennett. The precise phenomena, resulting from the repeated examination for *sugar* by the *cupro potassic* test, are always faithfully stated; but I have often been doubtful respecting the interpretation of the action of these reagents which depend upon mere shades of color, and hence lay no stress upon this item. It will be seen that the *record may* prove serviceable, however, for I have *since* met with the following, which I translate from Nysten's "Dictionnaire," as it calls attention to certain diagnostic marks derived from the behavior of albuminous urine under the influence of sugar and potassa. I had noted the varying coloration when testing for sugar, and as I preserved the record in every case, it serves at the same time to illustrate the practical truth contained in the quaint axiom gathered from Sir Thomas Browne, adopted as a motto and acted upon in the preparation of this paper:

"The results of researches made by Icery on the subject of albumen of the urine in different morbid conditions: 1. That this substance has not a composition entirely

similar to that of albumen of the blood; 2. That it is not found in every case with the same chemical characteristics; 3. That albumen, voided under the influence of Bright's Disease accompanied with anasarca, differs essentially from that which is contained in the renal excretion of females *encientes*, or which is secreted in an accidental and ephemeral manner; 4. That it is always possible, by inspection alone of the urine and by the aid of a special reagent, to distinguish these two species of albumen.

"The oxyde of copper held in solution by caustic potash, gives rise in contact with albumen to a beautiful violet red color, and produces a black precipitate, floculent and more or less abundant. These two effects are not manifested simultaneously. The violet color appears when it is cold, as soon as the oxyde of copper finds itself in presence of the albumen. The precipitate, on the contrary, does not show itself in a fluid of which the temperature is above 40° to 50° centigrade; but at the end of several hours, and even then, it is not completely formed—but it suffices to determine its apparition, to heat the liquor in the flame of a spirit-lamp for one or two minutes. This precipitate, formed of the sulphuret and phosphuret of copper, is the product of the action of the oxyde of copper upon the sulphur and the phosphorus abandoned by the albumen, which, under the influence of the potash hydrate, is transformed and passes to a state of proteine. In order that this double reaction should be produced, it is indispensable to avail ourselves of an excess of the *alkaline cupric* liquid. When the copper is not employed in *sufficient* proportion, the liquor, at first of a violet tint, is discolored little by little by the heat, and soon resumes its primitive transparence in abandoning the saline compounds formed; it suffices, then, to add anew a quantity of the reagent to restore the color which it had presented before being submitted to ebulition, and to complete the precipitation of the whole of the sulphur and all the phosphorus of the albumen. By the aid of this reagent,

the employment of which is very simple, we can recognize in a liquid traces of albuminous matter which would have escaped the action of heat and of nitric acid. It is prepared by adding drop by drop in liquid and concentrated potash a solution of the copper salt, until we obtain a liquid of a beautiful dark blue shade. In order to secure the exact admixture of these two substances, and to avoid the precipitation of the oxyde of copper, we should, at each new drop that is allowed to fall, rapidly agitate the vessel which holds the potash solution. The white of egg, the serum of the blood, and all the products of secretion containing albumen, furnish with the alkaline cupric liquor the characters indicated above. But the albuminous urine of pregnant women does not give rise to any reaction in presence of the alkaline cupric mixture; on the contrary, that of Bright's Disease, complicated with anasarca, assumes a violet color, precipitates a black substance, comports itself, in a word, just as does the white of egg and the serum of the blood."

Let us now examine the "*Statistical Table*" *No.* 1, to discover if it exhibits any *characteristic features* as peculiar to any disease. I think it will show plainly a striking numerical preponderance of certain principles in one disease, or in classes of allied diseases—which are again quite absent, or exist to a much smaller extent, in another disease or class of diseases far removed from the first.

This table I have divided into thirteen subdivisions, each representing a single disease, or one or two diseases closely related to each other; and by glancing the eye down the column of figures appropriated to each, we can readily note the frequency with which any of the thirty-six principles or elements occur—the presence or absence of which was recorded. I am not aware that a work similar to this has ever been undertaken. As incomplete as it is, I think some of the results furnished by it will repay observation.

The resemblances between the two first subdivisions that we observe arranged side by side, which include Yellow,

Remittent and Intermittent Fevers, have often attracted the attention of the physician and pathologist. Of forty-four specimens of Yellow Fever examined, *albumen* was present eighteen times; whilst in thirty-seven specimens of the renal excretion of periodical fever, it was found but twice.

Bile occurred twenty times in Yellow Fever, and but eight times in Intermittent and Remittent Fevers; whilst in both there was so slight a tendency to a condition like desquamative nephritis, that *tubular casts* existed but once in each, although the kidneys were excreting albumen, as we have just stated, eighteen times in Yellow Fever. On the other hand it will be observed, in inspecting subdivision five, containing "Bright's Disease," that "casts" are recorded eight times out of ten specimens examined with the microscope—albumen making its *appearance* seven times there also.

Epithelial scales (cells) were met with seven times in Yellow Fever, and four times in periodical fevers; their predominance being strangely marked in section eleven (Dyspepsia and nervous attacks, non-epileptiform), where, in five cases and fifteen specimens, their number reaches as high as six. The presence of cryptogamia was particularly frequent in Yellow Fever, relatively to other diseases.

Blood, again, was seen six times in Yellow, and but once in periodical fever; all of which are natural results and, in my own opinion, correspond with the most approved views respecting the difference in the pathology and terminations of the two sets of disease.

The *ammon. magnes. phosphates* and *urate of soda* are met with—the one twenty-four, and the other eighteen times in Yellow Fever—fourteen and twelve being the numbers affixed for these in periodical fevers; and the prevalence of these also as products of renal depuration, seem natural to the two forms of disease. These two substances are rarely found associated with tubular casts (see section 5), or with "bloody and purulent urine" (section 7); whilst the first exists frequently with "chylous urine"

(section 6), and in Rheumatism (section 9, where the proportions are given).

Oxalate of lime, ascertained to be present only once each in Yellow and periodical fevers, out of forty-four and thirty-seven specimens, respectively, is met with six times out of the five cases of Nervous Dyspepsia (section 11, where fifteen specimens were examined), and in three of the four specimens examined of "diseases of the osseous system" (section 8). Oxalate of lime is not found to be associated with "tubular casts," nor with the substances met with in the examination of "nervous epileptiform attacks." The section last named is rather characterized, as I said before, by the phosphates, by amorphous granular matters, and by vibriones. I found *carb. of lime* in both cases of "diseases of spine and osseous system."

Oil globules, rarely present (once in forty-four specimens) in Yellow Fever, are met with five times in periodical; and so little am I inclined to consider the uniform globules constituting chylous urine as identical with fat globules that I record the presence of the latter but twice out of the nine specimens of "chylous urine" (section 6).

Purpurine (*urrosacine* of some authorities), which Bird in his paper on "The Depuration of the Blood," calls "a slightly metamorphic form of an element of the bile, and which contains no less than sixty-three per cent. of carbon," was, as might naturally be suspected, very prominent in the renal excretion of both Yellow and periodical fevers. I think the appearance and disappearance of these and the phosphates, also of albumen, is of critical import in these diseases. In two out of three cases of Jaundice (section 3), it was almost black from excess of purpurine.

Bile was present twenty times in Yellow, and eight times in periodical fevers. It was, of course, found in the three cases of Jaundice, and its *absence* was strikingly manifest in nearly all the remaining diseases—eleven in number.

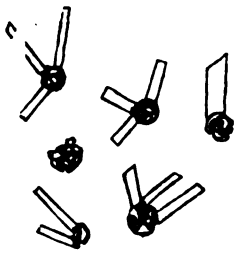
Uric acid. As I stated before, in a previous publication in the Charleston Medical Journal, its rarity in Yellow Fever is extraordinary. It is seen but once in forty-

four specimens, and then only after nitric acid had been added, so that the assertion was strictly correct. Future researches may readily account for this non-secretion, or arrest of escape of uric acid crystalized. It is met with nine times in periodical fever, also in Scarlet Fever; but most marked in frequency in "Dyspepsia and nervous attacks non-epileptiform;" not so in "nervous epileptiform attacks."

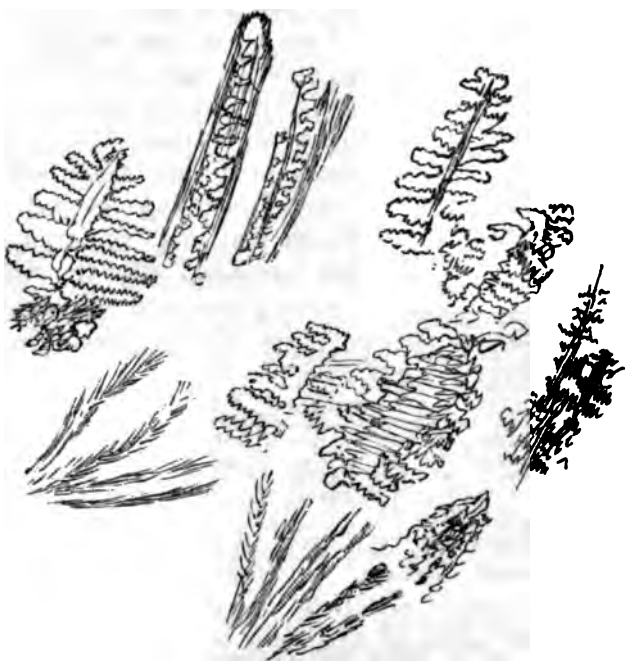
With reference to the bearing of these observations upon the absence of uric acid and the apparent defect in normal amount of nitrate of urea also, in Yellow Fever, and their presence in periodical fevers, I have spoken more fully in the several papers in the Charleston Medical Journal, upon the pathology and treatment of the two diseases. The rarity of the appearance of crystals of *nitrate of urea*, upon adding nitric acid upon a glass plate or in a watch glass, is also very striking; but, as it will be seen, I succeeded in obtaining them much oftener in the epidemic of 1858. I cannot account for this difference, if it is not a *true* one, save through the fact that my examinations during the prevalence of the last were made more promptly. I was certainly warranted in marking the absence of this substance in Yellow Fever after the epidemic of 1856; for in casually looking over my drawings at its conclusion, I found that in thirty-seven specimens of the renal excretion, examined after the addition of nitric acid, nitrate of urea *plates* were observed but once. Whilst, at the conclusion of my researches upon periodical fevers, out of nineteen cases (of which thirty-seven specimens were examined) I found *plates* of nitrate of urea eighteen times. This difference between Yellow and periodical fevers can hardly be fortuitous.

Nitrate of cystine! It will be remembered that I found *cystine* spontaneously crystalized in its striking form three times in several diseases. Observing during my repeated search for nitrate of urea that, sometimes alone or together with *plates* of *nitrate of urea*, there were other crystals differently shaped, in the original drawings I took special pains to represent them. These generally assumed two

forms (not *plates*); the one, consisting of projections from a central nucleus, thus:

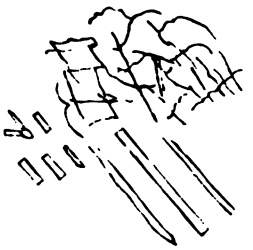


The other, made up of dendritic, plumose, or, as I have styled them, "Staghorn" crystals, are seen in the accompanying cut:



It will be observed that both of these are distinct from

the diamond-form lozenges, made by the crossing of lines of crystalization, which, it seemed to me from repeated examinations under the microscope, was the mode of growth of *nitrate of urea* plates. The upper part of the accompanying figure gives an imperfect view of nitrate of urea:



I have not now the opportunity of subjecting the crystals thus obtained and depicted above, to the appropriate reagents; but I have every reason to believe that they are for the most part *nitrate of cystine*. They correspond very closely with M. M. Robin and Verdeil's plates of this substance. M. Robin, Vol. II, "*Chimie Anatomique*," *suggests* that nitrate of cystine will probably be found much more frequently than is usually supposed; and he gives an interesting history of this substance, together with that of cystine itself. I hope that future and more careful examinations will show its pathological importance. These bodies were obtained most abundantly in "Gonorrhœal, Syphilitic and Ordinary Rheumatism" (section 9), and in "Dyspepsia and nervous attacks, non-epileptiform" (section 11).

As will be seen, by consulting the essays referred to in the Charleston Journal, the excretion or nonexcretion, or the absence of escape of uric acid and urea (together with the other phenomena of a disease like Yellow Fever), are points intimately connected with its pathology and treatment, and have, therefore, a most practical bearing. The inflammation of the capillaries; the complemental action of the skin and kidneys; the congestion of the

latter; the coma consecutive upon this; the escape of albumen, blood, bile, purpurine—all these are neglected in the consideration of its pathology, obviously only to the discredit of the observer.

My own opinion is that their consideration, the establishment of their absence, presence, frequency or amount, is fruitful in utility. In comparing two allied diseases, like Yellow and periodical fevers, the establishment and consideration of similar data must evidently be important. We are not called upon to assert that any of these substances are absolutely present or absent; their *relative* increase or decrease may be equally significant and instructive in a pathological point of view—just as the relative amount of tubular casts, blood, pus, bile, etc., are important, though some of them may be said never to be entirely and absolutely absent. The question of plus and minus, of *amount* in other words, though roughly calculated, is often enough to confirm a diagnosis, or give assurance to what would otherwise only be a mere suspicion of certain pathological changes. A single tubular cast, for example, seen under the microscope, would not prove a case to be one of Bright's Disease, whereas fifty would be conclusive.

TABLE NO. 2.–PRINCIPLES, SUBSTANCES, ECT.,

Observed in Black Vomit of Yellow Fever, Bilious Fever, Cancer of Stomach, Gastritis and Ordinary Vomit, relative frequency, etc., to aid in distinguishing the first-named.

	No. 1.	No. 2.	No. 3.
	Black Vomit of Yellow Fever. 8 cases examined.	Black Vomit of Remittent (Bilious). 2 cases examined.	Black Vomit of Cancer of Stomach. Gastritis and Ordinary Vomit. 5 cases examined.
Black matter dissolved by nitric acid	1		3
Black matter not dissolved by nitric acid	6	not examined.	1
Not coagulated by heat or nitric acid	6	not examined.	3
Coagulated by heat and nitric acid (albumen)	1		
Degenerated blood corpuscles *absent*	3 and 1 doubtful.	2	4
Degenerated blood corpuscles present	3 and 1 doubtful.	1	?
Blood corpuscles not degenerated	0	2	1
Round masses not blood corpuscles, cellular	2		1
Irregular crystalline masses (sandy?)			
Round black masses (hard, uric acid?)	3		3
Circular bodies, concentric. (See Diseases)	3	1	
Large crystalline masses not dissolved by nitric acid		1	3
Fluid glairy-adhesive	4	1	1
Bile	1	1	1 and 1 ?
Sugar	3	2	
Oil globules	4	2	4
Epithel. scales, columnar and pavement	5	absent both cases.	1
Cryptogamia	2		1
Hæmatin crystals	1		
Cryst. after nitric acid (not plates of nit. of urea)	4	0	1
Wedge-shaped bodies, characteristic	1		
Bodies—starch granules or resembling them			
Acidity	2		
Liver cell!	2? abs. 4 times.		
Corpora amylacia several times present			

Examination of Statistical Table No. 2. For purposes of comparison, it embraces the three following subdivisions: 1. Substances found in the *black vomit* of Yellow Fever, specimens from eight cases examined; 2. Black vomit of Bilious (periodical) Fever, two cases; 3. Black vomit obtained in Cancer of Stomach, Gastritis, Dyspepsia—one case of ordinary vomit is also included in the last subdivision, which I regret.

It is only in this way that we shall ever come to any definite conclusion respecting the true distinctive nature of black vomit of Yellow Fever, i. e., by comparing it *side by side* with black matters vomited in other affections *not* Yellow Fever.

This table, for want of a larger number of cases examined of diseases other than Yellow Fever, must be regarded as only the beginning of a work of this kind, and, indeed, of any attempt to ascertain, by a microscopical and chemical examination of the matters vomited, such a difference between Yellow Fever and other diseases apt to be confounded with it, as shall be practically useful. So far as the present paper teaches anything (independently of any merit in the drawings themselves), I can only say that the most repeatedly characteristic substances in black vomit of *Yellow Fever*, are "black matters *not* dissolved by nitric acid," though this was found once also in subdivision 3, which embraces "black vomit of *Cancer of the Stomach*," etc.

A "*glairy*" fluid is very common in the black vomit of Yellow Fever—it was only once found in the other subdivisions, 2 and 3. "Epithelial scales" in two varieties, are often met with in the black, or coffee grounds, matters vomited in Yellow Fever. Other substances almost characteristic, so far as these data teach, are "crystals after nitric acid," *not* assuming the form of *plates* of nitrate of urea.

It appears also, from my examinations, that "degenerated blood corpuscles" were three times *absent* in the eight specimens of black vomit of Yellow Fever exam-

ined. It is often difficult to state *positively* that the black, or brownish granular masses, so often seen with the microscope in the matters vomited in Yellow Fever, are, or are not, disintegrated blood corpuscles. This is the more so as they do not often assume a circular or imperfectly circular outline.

The "circular bodies with concentric rings" I have called attention to in Table No. 1, are also seen in the vomit of Yellow Fever. "Corpora amylacia" are several times noted in each of the subdivisions in the table (2) under consideration. The reader, however, can very well himself note the special phenomena in each subdivision. I have never yet examined what is called the "*white vomit*" of Yellow Fever; this should not be omitted, as it may represent a transition stage interesting both in a purely microscopical, as well as a purely pathological point of view.

TABLE No. 3.—*Surgical Diseases, Tumors, Concretions, etc.* I need not call special attention to the peculiarities observable from a comparative examination of this Table, but will refer the reader to it.

STATISTICAL TABLE No. 3.—SURGICAL CASES, FLUIDS, ETC., AND SOLIDS.

	Fluid from Ventricles of Brain.* 3 Cases. 3 Specimens.	Dropsical Fluids obtained by Tapping, etc. 5 Cases. 5 Specimens.	Fluids from Testicle, Hydrocele, etc. 3 Cases. 3 Specimens.	Blood from Uterus, Arm and Heart. 1 Case each.	Gall Stones "Cholelithe."	Tumors. 4 Cases.
Granular masses	2	1	2			2
Blood disks	3	1				
Organic globules	1					
Albumen	3	4	3			
Purpurine		?	0			
No purpurine	2	4				
Bile present					Abundant	
Bile absent	3	2	0			
Iodine absent		4				
Cryptogamia	0	0	1			
Vibriones	1	0	1			
†Crystals after nitric acid	3	0 (1 irreg. form pl's)	2 (irregular forms)		Irregular, pale	
Crystals after nitric acid absent						
Fat globules		0	2			3
Cholesterine		2	1		Absent	2
Neutral		2				
Sugar		2				
Round bodies like urate soda		2				
Large irregular crystaline bodies	1			2—some irr'r, pale		
Crystals after nitric acid, diamond form	2	0				
Crystals before nitric acid, diamond form	1					
Fibrous structure						3
Cancer cells	0	0	0			1
Osseous structure						1

*Some of this fluid was mixed with a little blood in one case.

†These are precisely like the *nitrate of cystine*, which I have reason to think are so much oftener found in the renal excretion than is generally supposed, though M. Robin hints at such a possibility (Vol. II).

FEVERS.

Before commencing the first of the six subdivisions of Diseases into which this Essay is divided, viz: Yellow Fever, I desire to make one or two explanatory remarks: I speak frequently and present specimens of "albuminous-looking" bodies—referring to fine, delicate, light masses, sometimes granular, often amorphous, and often assuming a regular shape, which I suspected to be always *albuminous* in character. This is not strictly true, I find, upon more extended observation, for albumen is often invisible in a fluid, even by the microscope, before heat or acid is added. The reader will see many specimens scattered through the following figures. At first, I drew many of them supposing that they might be tubular casts. The definite shape and well-defined outline of these lead me still to presume that they have assumed a form given them during their sojourn in the kidney, and their number is almost characteristic of Yellow Fever. I append the three figures which follow, in order that they may be compared with an excellent specimen of the desquamative casts which I obtained from a case of Bright's Disease, or true Albuminous Nephritis—see the third figure. The first two figures are from cases of Yellow Fever; in using the third here, I anticipate another subdivision of this Essay (Part II), where diseases of the kidneys, etc., are illustrated.

No. 1.—YELLOW FEVER.

RENAL EXCRETION EXAMINED WITH THE MICROSCOPE AND BY CHEMICAL REAGENTS.

Case 1*st.*—August 22. *Hensler:* With bloody urine, and recovery. Yellow Fever, sick seven days; specimen of renal discharge obtained 20th, patient very ill.

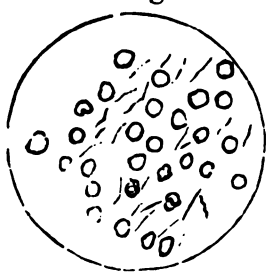


Fig. 1.

Upper surface under microscope, see Fig. 1, presenting large quantities of regular fat globules; no nucleus, even with the glass of highest power. One or two of them occasionally broken, irregular and yellowish—generally regular; vibriones present.

Lower strata, Fig. 2, red, with blood; under microscope, blood corpuscles abundant. No crystals; occasional masses of granular matter.

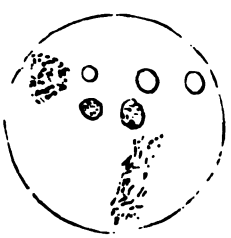


Fig. 2.

Another specimen examined 26th. Patient is recovering as it were by a miracle. Urine now free of blood, clear amber color, yet some shrunk-up blood corpuscles under microscope, see Fig. 3. No crystals; epithel. scales; not much albuminous granular matter.

Fig. 3.—Disks at right of figure small, white and clear.

In same specimen, examined at end of third day, I found dumb bell crystals, urate of soda and phosphates. Figs. 4 and 5.

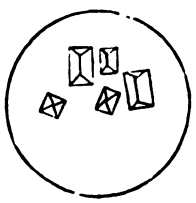


Fig. 4.

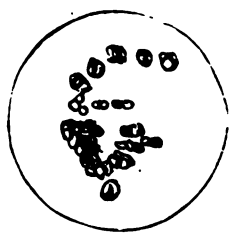


Fig. 5.

Case 2d.—August, 1856. *Mathews:* Specimen sent from Roper Hospital; sick three weeks. First case—resembling, if not clearly Yellow Fever. Patient taking infus. serpentaria, chlorate of potash, and quinine.

Fig. 6.

Urate of soda and ammon., magnes. Phosphates under microscope.

Case 3d.—August 20th. *Cunningham:* sick since 23d; Yellow Fever; Roper Hospital; specimen obtained this morning; light colored, not much sediment. Under microscope, epithel. scales very large; round white bodies;

blood corpuscles, small, wrinkled, crenulated; large granular masses, no crystals, non-crystalline black masses.

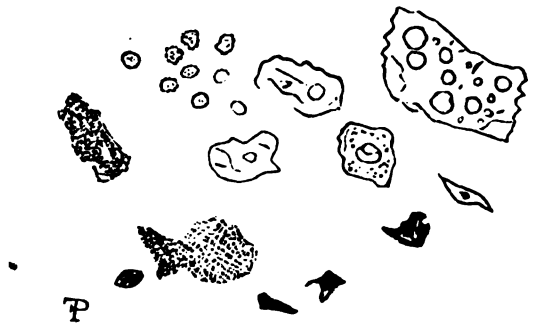


Fig. 7.

Action of reagents: Urine rendered turbid by heat; more evident by nitric acid; no purpurine; no crystals when the specimen was examined the day after.

Another specimen, sent from the Hospital August 30th, examined 1st Sept. Dark greenish hue; large amount of sediment.

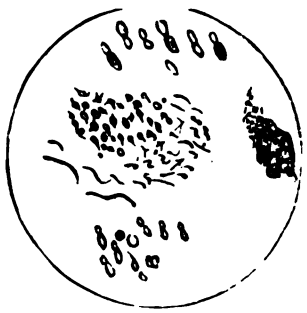


Fig. 8.

Microscopic examination of *upper surface:* whole deeply stained as it were with bile; confervoid growths — minute little whitish dots, with prominences, not perfectly round (see centre of Fig.) Also, vibriones; no blood corpuscles or crystals.

Lower strata: very thick sediment; large amount of fine, granular, yellow substance, apparently stained with bile — homogenous; also, some whitish bodies as described in upper strata (Fig. 8), probably vegetable growths.

Fig. 9.

Action of Chemical Reagents: Heat rendered it very turbid and thick, nitric acid giving it a greener color—more decided than I had ever observed in any specimen of urine (bile). Acetic acid produced no change. Fermented with carb. of soda, with the effect of clearing it considerably. With hydrochloric acid fermented, but leaving no deposit or thickening: hence no albumen, and the fine, granular matter, so often seen under the microscope, not always albuminous.

Fig. 10.

Same examined Sept. 2d. Yellow crystals, resembling in shape hæmatine; not unlike uric acid plates; specimen still having color of bile; no blood corpuscles; same white particles as above noticed.

Action of Chemical Reagents: With heat, cleared up completely; very much less sediment; with nitric acid very dark, foamed, showing purpurine and bile; no great amount of sediment, as in the other examination; *no albumen;* homogeneous; turning blacker than I have ever seen with nitric acid (purpurine).

Examined on 3d. Still entire absence of crystals, unless the hæmatin depicted above.

Another Specimen examined on 6th Sept. Odor peculiar; yellow globules, with prismatic rings—very yellow color; also, yellow masses and globules, like yellow oil (stained with excess of bile); yellow oil globules could be seen floating on surface.

Fig. 11.

Heat had no marked influence; nitric acid discolored and blackened it (purpurine and bile); foamed with soda.

Case 4th.—Lawson: Recovery. Specimen examined 17th, collected 16th, 1856; sick five days with Yellow Fever; aet. 21.

Upper surface: Vibriones small, active.

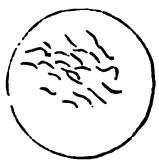


Fig. 12.

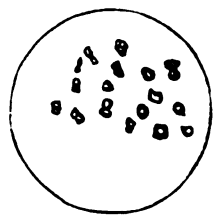


Fig. 13.

Small black bodies, always with centre white — some double; characteristic — resembling dumb bells; urate of soda.

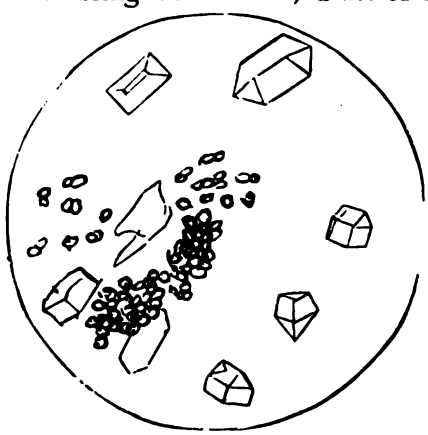


Fig. 14.

Lower strata: (Fig. 14,) abundant precipitate, almost entirely of urate of soda; also, large crystals of ammon. magnes. phosphates—both kinds abundant. Patient convalescent; taking whiskey, milk and lime water; the urine in this entirely different from that of *Lockerly's.*

Examined by Reagents: neither nitric acid or heat give evidence of presence of albumen; purpurine abundant; ferments much when nitric acid is added.

Case 5th.—Mrs. Watts: Recovery, after Black Vomit. Specimen collected Sept. 5th, examined 7th, 1856; Roper Hospital; Yellow Fever; very little sediment; colored.

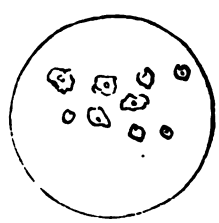


Fig. 15.

Upper surface presented nothing characteristic under microscope; roundish, clear bodies, with nuclei; hardly to be considered disintegrated blood corpuscles.

Case 6th.—Mrs. Hickey: Sick with Yellow Fever eight or ten days. Specimen procured yesterday, 10th; color red, resembling blood.

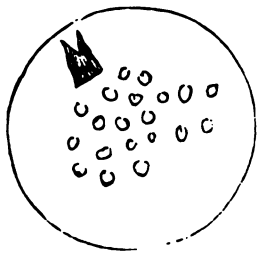


Fig. 16.

Upper surface under the microscope: Blood corpuscles abundant; small, round, white—*not iritic*—in size slightly variable; no nucleus, but occasionally a little dot in centre of each, perfectly circular, though artist has not copied accurately. Compare this with Fig. 1. One light colored crystal present—not characteristic.

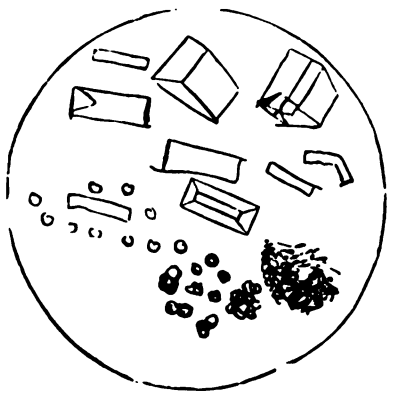


Fig. 17.

Lower strata: Same in appearance, — only with flakes of mucus; blood corpuscles perfectly circular; triple phosphates and dark colored urate of soda.

Examined by Reagents: Not coagulable by heat but by nitric acid, which only separates large sediment upon cooling; boiled up excessively, as usual when urates and phosphates are exposed to acids; does not ferment with soda.

Fig. 18.

Specimen from same, collected to-day, 11th Sept.: Much lighter colored than first, as if containing less blood or none; crystals much smaller; none of the white bodies (blood disks); urate of soda and amorphous matter.

Action of Reagents: Cleared up by heat; reddened almost like blood with nitric acid (purpurine); ferments and boils up; no separation upon cooling; does not ferment with soda.

Fig. 19.

Specimen from same examined 12th: Very light, white sediment; strong ammoniacal odor; urates and phosphates abundant, with extraneous substances, hairs, fibres, etc.

Examined by Reagents: Heat does not coagulate it, nor nitric acid, only effervescing *very much*—no discoloration following; sediment and crystals dissolved, and fluid made clear by the addition of the acid; no albumen.

Note.—Patient entered with Rheumatism; had had black vomit; convalescent the 13th.

Case 6th.—Specimen examined 16th, obtained 17th, 1856. *Lockerly:* With Yellow Fever, from Marine Hospital (sick eight days); no black vomit.

Upper surface of urine examined with microscope, presenting nothing characteristic.

Lower strata (Fig. 20): Light, granular, floating masses—apparently albumen; also, hard, thick crystals, not very regular, but solid. The light, granular masses abundant; also, abundance of the small, yellowish, circular bodies (degenerated blood corpuscles?) variable in appearance, scarcely possessing a nucleus—only dotted—clear and increasing as the fluid dries on the glass.

Fig. 20.

Fig. 21.

Many hard, rough, yellow bodies, resembling uric acid; one immense—darker in the centre than at circumference. These characteristic, [artist has not copied my figure closely,] see Fig. 21. Much granular matter.

Examined by Reagents: With application of heat, albumen abundant; coagulated and separated by addition of nitric acid; some fermentation; no purpurine; slight fermentation when soda is added.

Case 7th.—Specimen sent on 15th, examined same day. *Peterson:* Roper Hospital; Yellow Fever. It is possible that this specimen was retained at Hospital before being sent to me. Thick; strong ammoniacal smell.

Upper surface showing: Confervoid growth; urate of soda; triple phosphates.

Fig. 22.

Lower strata: Presented accompanying microscopical appearances—objects in Figs. 23 and 24 unusually large, visible to naked eye: Fig. 23, triple phosphates and urate of soda.

Fig. 23.

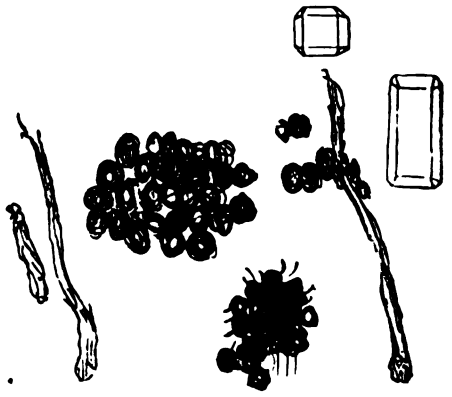


Fig. 24.

Fig. 25.

Fig. 25: Light-colored; not stained; appearing upon evaporation.

Chemical examination: Heat cleared it up; with nitric acid neither thickening or changing in color.

The following examination proves that the above was alkaline, urate of soda, etc.:

1. Nitric acid destroyed the crystals completely, all except the tubular extraneous bodies, with effervescence.

2. Hydrochloric acid had a similar action—not influencing the vegetable growths, but almost destroying the tubular forms; a black mass, as represented Fig. 26, was left; nor could nitric acid complete the destruction of this.

Fig. 26.

Another specimen, collected 17th, examined 18th: Very large amount of yellow, chalky deposit.

Upper surface: Crystals dark brown.

Fig. 27.

Lower strata: (Fig. 28.) The crystals of urate of soda, etc., of course all destroyed by nitric acid, under the microscope, with effervescence. Blood corpuscles present. The tube-like bodies were rendered paler by nitric acid; these are nearly always foreign substances, particles of wool or cotton from bed, etc. The yellow bodies were not destroyed, nor their color lost; hard, crystalline bodies also not destroyed.

Fig. 28.

Action of Reagents: But slightly affected by heat; by nitric acid, darkened more than that obtained on 17th, relatively (purpurine); no particular increase of sediment.

Bile scarcely appreciable by test; alkaline.

Vegetable growths even more distinct after ammonia was added—or it possessed a very slow effect upon them.

From a portion set aside after nitric acid was added in a test tube, and examined on the 17th:

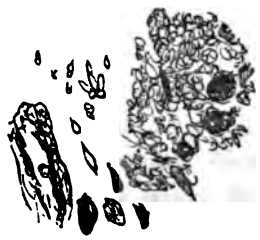


Fig. 29.

The *upper surface* presented, under microscope, the appearances depicted in Fig. 29: Light yellow, somewhat granular matter, with dark, round bodies; blood red—thicker; confervoid growths.

Lower strata, represented by Fig. 30: Dark crystals, round, like urate of soda? It is difficult to understand how such bodies, which are plainly urate of soda, should have remained undestroyed by nitric acid. There must be some mistake. The tube or hair-like body remained after all acids had acted. The dark, fibrous masses to right of figure, stained yellow; confervoid growths.

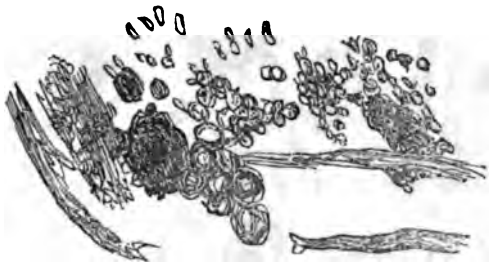


Fig. 30.

Specimen from same, collected 17th, examined 17th: Clear amber color; mucus-looking particles floating in it.

Action of Reagents: Not thickened or turbid by heat, but

very much darkened by nitric acid, showing purpurine, with effervescence.

Case 8th. — Specimen obtained 10th, examined 12th. *Wray:* Roper Hospital; very ill on the 10th; light colored.

Upper surface: One crystal of triple phosphate; urate of soda present.

Fig. 31.

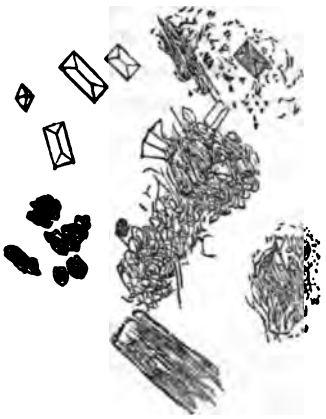


Fig. 32.

Lower strata: Pale, chalky and flaky sediment; ammoniacal odor; against the light, urine in vial has a greenish yellow color, like bile. Some of the scales represented are stained with yellow bile — some much more yellow than others; one in lower part of cut light, and of a chalky color.

These (Fig. 33) probably foreign substances: hairs, bits of bed clothing, etc.; some have strangely the appearance of animals: Polonius would have said, "very like a *fish.*"

Fig. 33.

Action of Reagents: Heat did not coagulate it, or make it more turbid; with nitric acid, effervesced so actively that

nearly all in the test tube escaped; did not coagulate; it became slightly darker, then cleared up. There was seen afterward some separated matter floating in it (trace of albumen?)

Case 9th.—Brady: Yellow Fever, from Roper Hospital. Patient was discharged Sept. 12th.

Fig. 34.

Specimen light colored, dark, rough bodies; vegetable growths; the streaked granular matter in lower part of cut light colored (yellowish.)

Action of Reagents: Does not coagulate by heat, rather clears up; nitric acid only darkens it (purpurine); does not even cloud; very little effervescence.

Case 10th.—Specimen obtained 22d Sept., 1856, examined 24th. *Armstrong:* Third day with Yellow Fever; resident of Elizabeth street; had taken calomel, quinine and cit. potash.

Action of Reagents: Specimen pale; mucus present; acid reaction; cleared with heat; purpurine slight; no albumen; nitric acid clears it; no fermentation; no sugar; no bile. Confervoid growths abundant and characteristic.

Fig. 35.

Case 11*th.*—Specimen obtained 17th, examined 17th Sept., 1856. *Kelligan:* Roper Hospital; Yellow Fever—not distinctly marked. Specimen exhibited dark froth, as if tinged by bile.

Action of Reagents: With heat, thickening; very albuminous; nitric acid separated the albumen; color darker, showing bile and purpurine; darkening very much; no effervescence.

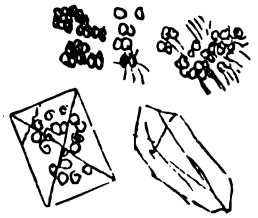


Fig. 36.

Same examined 18*th. Upper surface* under microscope, Fig. 36.

Lower stratum: Yellow, flocculent deposit abundant; urate of soda and triple phosphates. The small, circular disks in lower part of figure were clear and pellucid, resembling organic globules.

Fig. 37.

Action of Reagents: Examined with heat; did not thicken, but became a little clearer, though leaving shreds; frothed a great deal; hue greenish; when nitric acid was added, nearly all boiled over; did not turn near so dark as on the day before. A great deal of sedimentary matter separated, showing that albumen is exhibited on the second day. Iritic hue, showing bile, on white plate; alkaline reaction.

Note (made subsequently).—"In another specimen of Kelligan's? urine found in a test tube (to which nitric acid was added several days since) with much sediment in it, I noticed the same *albuminous* appearance—identically similar to same phenomena as observed in examination of

Fig. 38.

Shempfel's case, further on, with the addition of crystals of dark, red hue floating in the tube, many of them regular; nitric acid dissolves them, with evolution of bubbles." The crystals, Fig. 38, are undoubtedly those of uric acid.

Case 12*th.*—Specimen obtained 18th, evening, examined 19th. *Luna:* Roper Hospital; Yellow Fever? Pale color, thick.

Action of Reagents: Not altered by heat; slightly reddened by nitric acid (purpurine); not cleared.

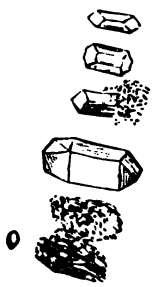


Fig. 39.

Re-examined 20th, with reagents and by microscope; slight trace of bile; alkaline reaction.

Surface: Triple phosphates, and granular matter with usual elongated form.

Lower stratum: Urate of soda, phosphatic deposits; corpuscles resembling mucus, and very minute, crystalline plates.

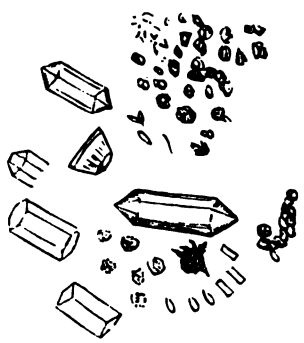


Fig. 40.

Case 13*th.*—Specimen obtained Sept. 18th, evening, examined 19th. *Shempfel:* Roper Hospital.

Appearance of specimen: Reddish colored, dark froth on surface, stained with bile; red flakes at bottom of vial.

Action of Reagents: Heat very much thickened the entire mass; not so dark; nitric acid did not increase this; immense deposit; (behaved in the same way when examined the 20th, with hydrochloric acid and heat; no purple or lilac color;) (no purpurine?)

Surface: Examined 19th, granular matter.

Fig. 41.

Fig. 42.

Red, albuminous-looking granular matter; the flakes investing the tube, which is of vermilion color, look under naked eye like clotted blood, as in Fig. 44, also. No crystals or blood corpuscles.

Action of Reagents.—Examined on 20th for bile; no coloration on white porcelain; acid reaction; same examined 20th, with microscope:

Surface: Vegetable growths, white, transparent, round disks and epithel. scales.

Fig. 43.

Lower strata (Fig. 44): Dark red, granular sediment, and *strings* apparently formed of disorganized blood or colored mucus, both visible to the naked eye and under microscope, or like brownish colored stains (albumen?); confervoid growths.

Fig. 44.

Action of Reagents.—Boiled with liquor potassae, etc.; sugar decidedly indicated.

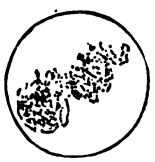


Fig. 45.

Note.—The specimen collected the 18th, and then mixed with nitric acid in test tube. Examined 21st, the albuminous-looking residue I find now to be fine, brownish and granular; no crystals or other substance. See Fig. 45.

Same specimen obtained 18th, examined on 21st.

Upper surface had on it a white pellicle, like cheese, made up of a vegetable growth, composed for the most part of single buds. Fig. 46. Nitric acid dissolved the irregular crystals—did not affect the confervoid growth; it imparted to them a red dot like a nucleus.

Fig. 46.

Fig. 47.

The same appearance was noticed the same day in examining the specimen of urine obtained from Farley, only the confervoid growths were longer; not destroyed by aqua ammon.; crystals forming in both cases (viz: Farley's and Shempfel's?) represented in Fig. 47.

Another specimen of renal excretion obtained from Shempfel's; sent to me 22d, examined 23d: Acid reaction; dark, yellowish red, apparently tinged by bile; sediment red.

Lower stratum: Generally stained of a yellow color, as if by bile; tubes, or fibres, abundant; granular (albuminous-looking) matter, some resembling tubular casts.

Examined for nitrate of urea with a negative result.

Fig. 48.

Reagents: Very albuminous by heat; not much effervescence; with nitric acid no increase, only a separation of the albumen; no change in color; no bile, tested by nitric acid on white plate; sugar hardly present by the cupropotassic test.

Case 14*th.*—*Jocinth:* Marine Hospital; Yellow Fever; specimen sent of reddish color.

Urate of soda and rectangular crystals.

Fig. 49.

Action of Reagents: Heat does not coagulate it; with nitric acid, clears up; it dissolves and lessens the red color, with great effervescence.

Case 15*th.*—Specimen obtained 12th, examined 12th; Roper Hospital. *Ruddy:* Yellow Fever? Disease not stated on label sent; specimen light colored; cloudy in middle strata; entered Hospital the night before, having been sick two days.

Epithel. scales, beautifully tessellated, very large: no crystals on upper surface: urate of soda in lower strata.

Fig. 50.

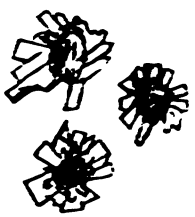
Action of Reagents: Heat rendered it slightly cloudy; with nitric acid it scarcely effervesced, but reddened (purpurine), and separated: some sedimentary matter floating through it.

Same specimen examined 12th: it has changed color; whitish, large amount of sediment.

Urate of soda and triple phosphates, with minute granular matter, and fine, circular bodies, larger than "organic globules," but smaller than blood disks. [The artist has not copied my drawing accurately.]

Fig. 51.

Action of Reagents: To-day heat clears it up—nitric acid also clearing it—with no sediment or separated matter.



Some twelve or thirteen specimens of uric acid crystals were found, subsequently, in a test tube laid aside, containing some of Ruddy's urine with nitric acid. Fig. 52.

Fig. 52.

Same specimen which had been examined 12th, re-examined on 15th.

Upper Surface.

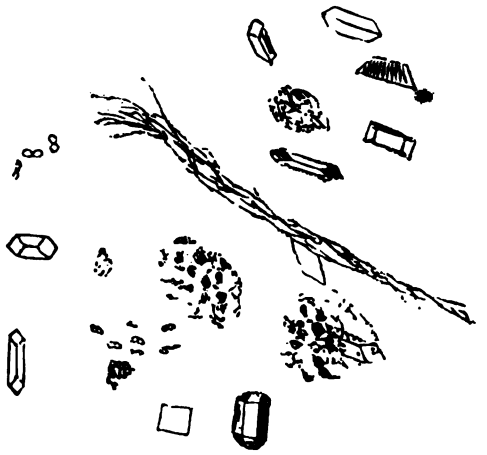


Fig. 53.

Lower strata white, chalky, and filled with urate of soda and triple phosphates; wedge-shaped bodies, films of hair, cloth, etc., with large epithel. scale. [Artist has not done justice to my drawing.]

Fig. 54.

In a note appended to this case, I find written: "among specimens of urine on my table, collected during the past eight days; none have confervoid growths."

Case 16th.—Specimen obtained 22d, examined 24th Sept., 1856. Sent from Roper Hospital. *Furlong:* Renal excretion pale, thick, yellow.

Action of Reagents: By heat, no sediment; foamed with nitric acid, with separation and deposit of sediment; bile present, by test, of pink hue, on white plate with acid; very slight trace, if any, of sugar by cupro-potassique test.

Lower stratum (very much as in case of Tobin): Fine, granular dots; also, yellow, granular bodies, of the regular, roundish, elongated form, so common in Yellow Fever; with crystals of ammon. magnes. phosphates.

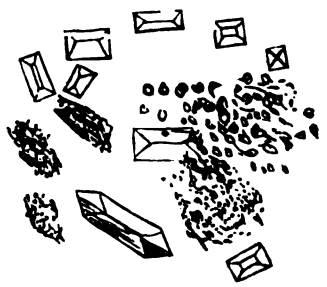


Fig. 55.

Same specimen examined 25th. *Action of Reagents:* Strong alkaline reaction; thick, lightish-yellow color; foamed over and thickened by heat; with nitric acid, nearly all wasted; thickened, but with no sediment like albumen; no sugar.

Specimen of 26th? examined 27th. Lower stratum, see Fig. 56: "Albuminous" matter, resembling tubular casts; epithelial scales stained yellow; minute, rectangular crystals and *extraneous* bodies.

Fig. 56.

Specimen of renal discharge in Furlong's case—though kept for two months, still contained vibriones in active motion.

Examined Feb. 19th: Not increased in size—quite as small; very active. See Fig. 57.

Fig. 57.

Case 17*th.*—Specimen sent Sept. 18th, examined 18th, 1856. *Farley:* Roper Hospital; Yellow Fever; pale, amber color; clear.

Action of Reagents: Neither heat nor nitric acid produced the slightest effect; latter only reddened it a little (purpurine); neither deposit nor thickening.

Re-examined 19*th.* Still amber colored, pale, white—cloudy at bottom.

Fig. 58.

Upper surface: Small, rounded bodies—white and clear; hard, crystalline masses.

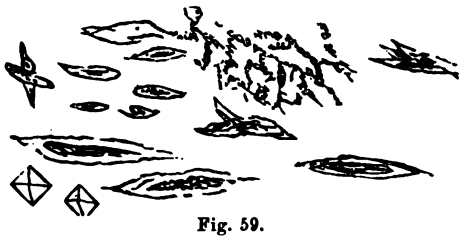


Fig. 59.

Light, purple, crystalline bodies, centre prismatic, Fig. 59.—These appeared when the preparation dried on the glass—forms which I had never met before.

Nitric acid converted the above, Fig. 59, into these dendritic crystals ("stag-horn"), dissolving the unusual forms represented in Fig. 59, and leaving these, Fig. 60.

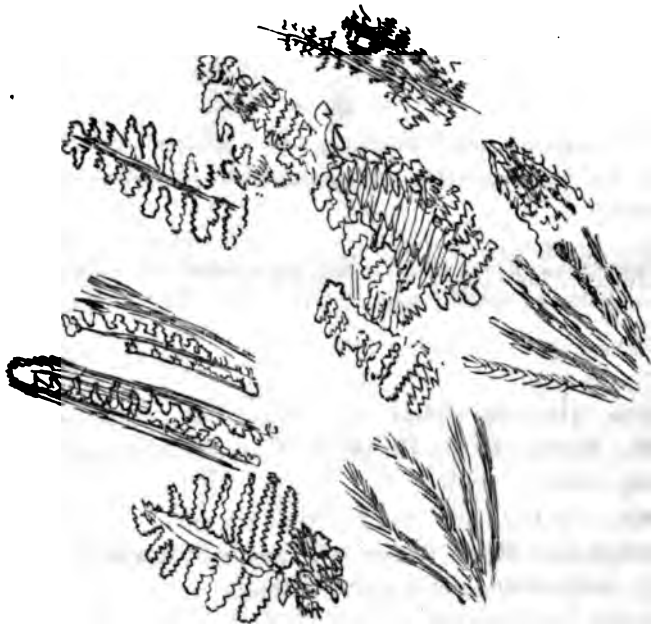


Fig. 60.

Lower stratum under microscope: Unusual number of epithel. scales, of large size, with nuclei, mucus or pus corpuscles; light, crenulated disks; granular matter; light yellow

Fig. 61.

color predominates; also, films and foreign bodies, bits of hair, wool? etc.; few confervoid growths; no crystals. Figs. 61, 62.

Fig. 62.

These preparations (Figs. 61, 62), when allowed to evaporate on the glass, did not present the same appearance as did the first (Fig. 58), treated in the same way; they furnished nothing similar to what is depicted, Fig. 59; but when the preparation of the lower strata was allowed to evaporate, and examined on the 20th, I obtained this result. See Fig. 63.

Fig. 63.

Transparent, pale, parallelograms, broken off at ends; fractured; crystalline; white, pale disks, some delicately fine—nature unknown; pale dots, with slight nucleus.

Specimen of 18*th*, *examined* 20*th*.—Tested for bile, none present; acid reaction; under microscope, epithel. scales present still; no crystals.

Fig. 64.

On 22*d*.—Vegetable growths of unusual length, not destroyed by aqua ammon. See Fig. 64.

Case 18*th*.—Specimen sent Sept. 22d, examined 25th. *Daly:* Roper Hospital. Labelled renal discharge "of the night;" very much of white sediment, pale, thick, yellow colored.

Action of Reagents: Cleared, then thickened by heat; albuminous; with nitric acid, darkened (purpurine); no effervescence; albumen coagulated by acid; sugar, I think,

present, by cupro-potassique test (more sediment when this test was employed than usual); acid reaction.

The original specimen was and is whitish, resembling chalk and water, with abundant chalky sediment, an inch high in the vial. Examined with microscope 27th; strange that there are no crystals.

Fig. 65.

Light, pale, white, confervoid growths. See Fig. 65.

Near lower stratum: Rounded "albuminous-looking" masses, finely granular (Fig. 66) oil globules.

Fig. 66.

Case 18*th.*—30th Sept., 1856. Patient of Dr. O. A. White's. Boy *Morgan:* Tradd street; sick seven days; improving; little fever, no black vomit or bleeding.

Fig. 67.

Action of Reagents: With heat, no deposit; with nitric acid, distinct greenish hue; no sediment (had been taking gallic acid.)

Light yellow (albuminous) granular masses, with tube or hair-like bodies.

Case 19*th.*—3d Oct., 1856. Specimen from patient of Dr. O. A. White. *Murphy:* Sick two days; fever had been violent; "white vomit;" case well marked; renal excretion scanty since first day.

Action of Reagents: No albumen; purpurine; no sediment after nitric acid added; delicate scum of upper surface under microscope presented vegetable growth? of this form, Fig. 68.

Fig. 68.

Fig. 69.

Lower stratum: Yellow "albuminous masses," granular, well defined—and I note, as unusually frequent in Yellow Fever; shape received in kidney, I think.

With nitric acid set aside to evaporate, saw beautiful, "stag-horn" crystals—visible to naked eye—and fine, delicate frost work, thinner than plates of nit. of urea, Fig. 70.

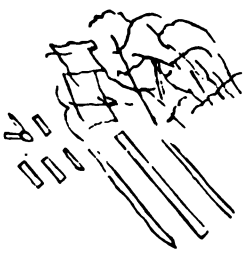


Fig. 70.

Fig. 71.

Case 20*th.*—Specimen sent Oct. 7th, 1856, examined 9th. *Daren:* Roper Hospital.

Specimen reddish, as if stained with bile; clear, white, variable, pale disks in upper part of figure, probably oil; yellow, fibrous masses, orange color; large cells, not unlike epithel. scales; no crystals.

Action of Reagents: Heat made it so thick as not to allow light to pass, turning it more yellow; separation taking place without nitric acid; nitric acid colored it red from a brick-dust color; purpurine present; no frothing; on a slip of glass, the cloudiness was plainly seen; bile evident; purplish discoloration by usual test; no sugar (perfectly clear when boiled with liquor potassæ), or possibly only a trace.

Case 21*st.*—Obtained 22d Sept., 1856, examined 24th. *Conner* or *Connel:* Roper Hospital. Renal excretion yellow, colored by bile; froth also tinged yellow.

Action of Reagents: The chalky deposit, when heated, almost wasted by frothing away; no deposit with heat. A sediment in test tube after nitric acid was added, has a thick, glutinous look; no sugar; bile present by usual test.

Lower stratum: Urates and phosphatic deposits, many of the crystals crenulated and irregular. Fig. 72.

Fig. 72.

Specimen of 26th. Paler, reddish yellow.

Treated by Reagents: Albuminous by heat; the albumen separated by nitric acid, without any froth from either agent; some discoloration (like purpurine); the color turns to a very rich, dark yellow; no greenish collection; pretty thick with albumen; acid reaction. When nitric acid was added to test for urea, hardly any crystals; evaporation by heat precisely similar to *O'Connel's*, presenting very delicate markings, with "stag-horn" and dendritic crystals, "nitrate of cystine." See Fig. 73.

Fig. 73.

Specimen of 26*th* examined microscopically 27th.

Fig. 74.

Lower strata: Presented thick (albuminous) looking bodies, compacted in appearance; brownish yellow, resembling tubular casts, and perhaps characteristic of Yellow Fever; I have noticed them very frequently; also, granules, with yellowish nucleus. Fig. 74.

Case 22*d.*—Specimen sent the 23d, examined 23d Sept., 1856. *O'Connel:* Roper Hospital. No crystals, only yellowish stained masses, closely resembling those depicted in Fig. 74.

Action of Reagents: Reaction acid; heat showed much albumen, separating it; nitric acid turned the albumen to a *blue* color!! the lower portion of test tube darker, the blue rising to the surface with the froth.

Fig. 75.

Tested for bile: Purplish, blue color (nearly green), on porcelain plate; no prismatic colors.

For sugar: Very slight traces, with cupro-potassique test (no thickening).

Fig. 76.

In testing for nitrate of urea, discovered by microscope thin plates of crystals—not characteristic—with dark bodies. Fig. 76.

Upon adding nitric acid on 24th, to test for urea, found the accompanying by using the microscope. See Fig. 77.

These forms also often accompany plates of nitrate of urea, and I find them to predominate in certain diseases illustrated in other sections of this Essay.

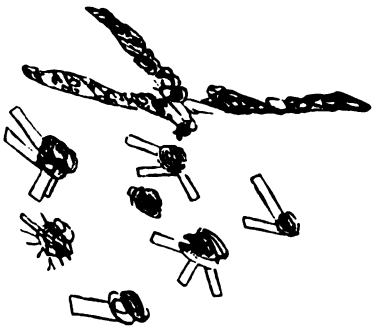


Fig. 77.

Specimen sent 22*d*, *examined* 24*th*. *Action of Reagents:* Same dark, biliary color; heat gave same indications—if anything, there was more deposit; with nitric acid, abundant green sediment, more than at the examination of the previous specimen; bile present, decided; sugar none; acid reaction.

Fig. 78.

Lower stratum: Dark, yellow-stained, fibrous and granular matter; no crystals; also, stained epithel. scales.

Specimen obtained from O'Connel: Collected 26*th*, *examined* 27*th:* Yellow, biliary color.

Lower stratum: Urate of soda abundant, all jagged; also, large striated and crenulated crystals, as represented Fig. 79.

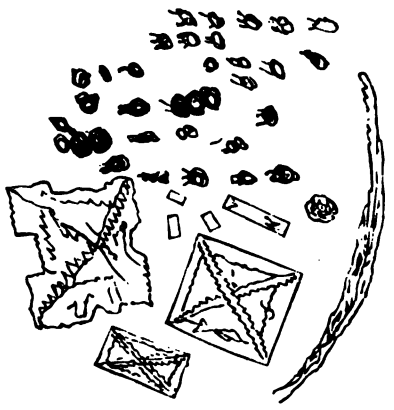


Fig. 79.

Action of Reagents: Tested for nitrate of urea and examined with microscope, I obtained the same dendritic plumose crystals visible to unassisted eye, which I denominate "stag-horn," and suppose to be nitrate of cystine, Fig. 80. Compare Figs. 73 and 81.

Fig. 80.

Upon heating this (the preparation just used), I did obtain the accompanying arborescent and laminated crys-

tals upon evaporation, very delicate; these resemble closely nit. of urea, but I have it stated in a note that "the portion set by with nitric acid presented no crystals of any kind, save a few round, apparently crystalline bodies," which I had drawn, but which the artist omitted in the accompanying wood-cut, Fig. 81.

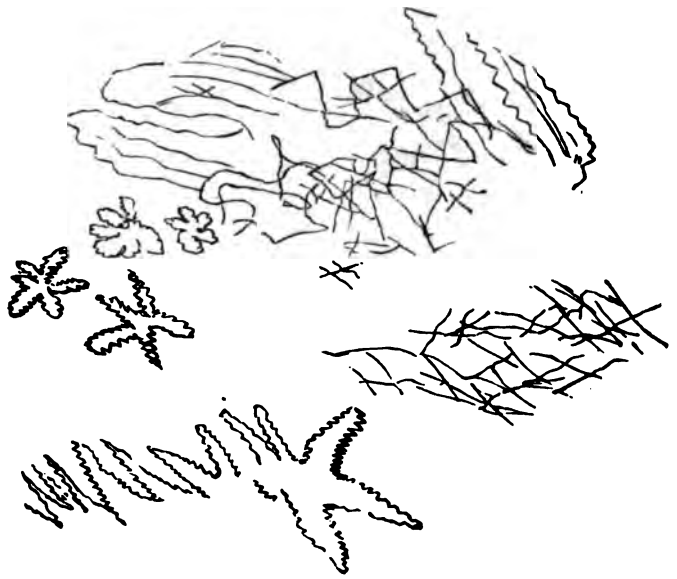


Fig. 81.

Specimen obtained 26th, examined same day.

Action of Reagents: Frothed up with heat, and boiled over with nitric acid; hardly thickened; scarcely, if any albumen; specimen still yellow and sedimentary, but certainly very great improvement, judging from the renal excretion; reaction neutral; sugar none; no sediment with liquor potassæ.

Case 23d.—Specimen obtained 22d, examined 24th Sept., 1856. *Tobin:* Roper Hospital. Pale colored, abundant, white, chalky sediment.

Action of Reagents: Alkaline reaction; cleared by heat and by nitric acid without sediment—frothed by latter; sugar none; no purpurine; bile very slight; pinkish discoloration by usual test.

Lower stratum: White, chalky deposit, composed of urates and phosphates, Fig. 82.

Fig. 82.

Case 24th.—Examined 11th, collected 10th Sept., 1856. *Fitzgerald:* Roper Hospital. Dark colored, slightly crystalline masses present, some epithelial scales; circular bodies larger than white blood disks, with granular nuclei; chloro-hydrate of ammon. represented on left of figure.

Fig. 83.

Action of Reagents: Heat does not coagulate it; nor nitric acid—only makes it darker (purpurine) than in Brady's case; effervesces a great deal.

Another specimen obtained 12th, examined 13th. Light amber color, not much sediment.

Fig. 84.

Upper surface under microscope, Fig. 84.

Lower strata: White, chalky, composed of urate of soda and ammon. magnes. phosphates; vibriones exceedingly minute; confervoid growths present.

Fig. 85.

Case 25th.—July 13th, 1858. From Dr. O. A. White: Patient resided Tradd street, near King; first person seized with Yellow Fever this season, and recognized by Dr. White; taken sick four days since; renal excretion collected this morning, light color.

Action of Reagents: With heat and nitric acid, albumen abundant; acid reaction; no purpurine, yet dark, muddy color; *bile* abundant (the black vomit was also examined, see under that section); examined with microscope 14th.

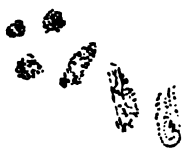


Fig. 86.

Vibriones abundant, almost the first that I have observed since last epidemic of Yellow Fever; these not represented in Fig. 86. Fragments of casts stained yellow; albumen, often round, resembling tubular casts, and highly tinged with bile (compare Fig. 74); no crystals (examined 14th); no sugar.

Examined 15*th.*—Found triple phosphates; also, urate of soda, all crenulated in form.

Note.—Weather has been very rainy for a week past, heavy falls of rain; patient a policeman, who had been sent to the Lazaretto in 1854 for Yellow Fever!! All then concurred that it was a genuine case; this attack, from which he died with black vomit, not less genuine; *no nitrate of urea* at any examination, though they were repeated, this substance being specially sought for.

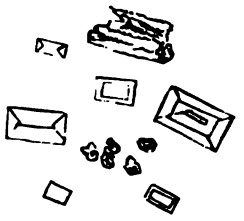


Fig. 87.

Case 26*th.*—Sept. 16th, 1858. Marine Hospital: *Thompson:* Has taken—℞. Calomel, grs. xx; quinine, grs. xx. Third day of sickness, renal excretion pale; triple phosphates of great size.

Action of Reagents: No albumen; slight purpurine; *nitrate of urea plates abundant*, not represented.

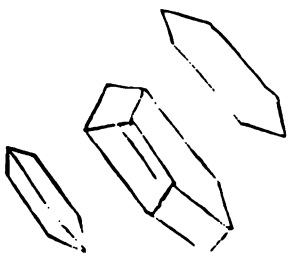


Fig. 88.

Case 27*th.*—Specimen obtained Sept. 11th, 1858, examined 13th. *Heathers:* Marine Hospital. Third day sick, maniacal delirium: renal discharge reddish; no albumen by usual tests.

Under microscope: Fig. 89, triple phosphate large, abundant; nitrate of urea plates abundant.

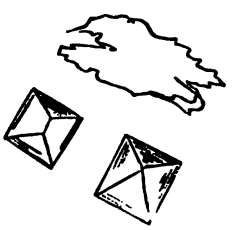


Fig. 89.

Case 27th.—Specimen sent Sept. 10th. *Smith:* Marine Hospital. Examined two days before death.

Action of Reagents: Albumen present; nitrate of urea, or rather "stag-horn" crystals in watch glass visible, with albumen; no *plates* like nitrate of urea of G. Bird; not like nitrate of urea under microscope; what was laid aside on glass slide with nitric acid only, presented acicular crystals; *no cystine.* (A specimen from Dr. De Saussure, jr., of a patient with Yellow Fever, presented albumen and "stag-horn" crystals; nothing spontaneously crystallized.)

Case 28th.—Sept. 16th, 1858, morning; examined in four hours. *Eilers:* Marine Hospital; sick eight days; bleeding largely from gums; has not taken calomel for six days; taking quinine and alkalies (see "Hospital Book"). Patient very ill—died subsequently. Renal discharge of yellow color.

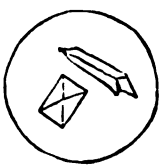


Fig. 90.

Action of Reagents: Slightly acid; albumen abundant; no purpurine; bile evident by test. Triple phosphates abundant the day previous to that on which he died.

Set aside on glass slide, with nitric acid, obtained:

Fig. 91.

Star crystals of unusual form. See Fig. 91.

Also, these forms: no plates. Fig. 92.

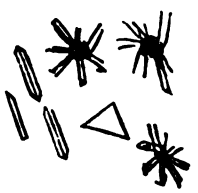


Fig. 92.

Case 29th.—Specimen sent October 17th, 1858. *Hunter:* Marine Hospital. Collected eighth day of the disease. Albumen, together with bile, present. Examined with microscope three days after: contained triple phosphates.

Another specimen, Oct. 20th. Action of Reagents: Does not coagulate so readily with heat, although albumen is great in amount; appearance turbid; looks exceedingly yellow, as if it contained much bile; turned pink, irridescent hue; with nitric acid, showing bile.

Fig. 93.

Specimen of Oct. 20th, examined with microscope: triple phosphates and oil globules in yellow fluid (bile), also, minute, rectangular plates numerous, urate of ammon.

Patient had great pain and weakness in the back. Specimen of three days ago (1st examination) contained no nitrate of urea. In specimen of the 20th, oil globules EVIDENT, but not in the specimen obtained 17th. NO NITRATE OF UREA. Patient died.

No. 2.—BLACK VOMIT OF YELLOW FEVER.

COMPARED WITH BLACK VOMIT OF BILIOUS FEVER, OF CANCER OF THE STOMACH, OF GASTRITIS, AND ORDINARY VOMIT.

I insert these figures without the text, which is not at hand. The first seven, I believe, are illustrations of Black Vomit of Yellow Fever. For explanation, the Statistical Table No. 2. may be consulted.

Fig. 94.

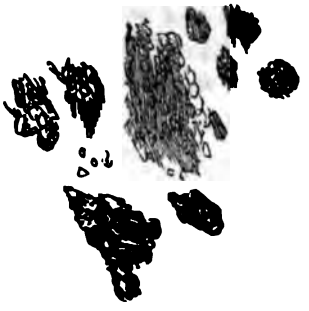


Fig. 95.

Fig. 96.

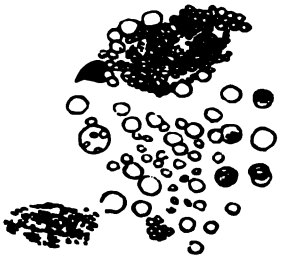


Fig. 97.

Fig. 98.

Fig. 99.

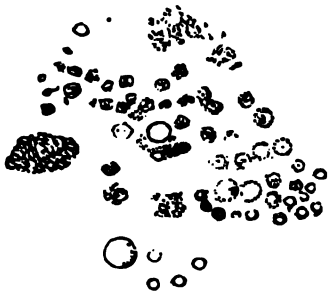


Fig. 100.

Fig. 101.

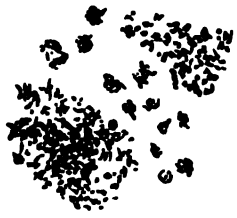


Fig. 102.

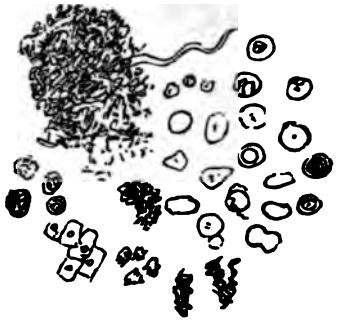


Fig. 103.

Fig. 104.

Fig. 105.

Fi . 106.

Fig. 107.